MOBIDATALAB

Labs for prototyping future mobility data sharing solutions in the cloud



# D3.4 Data Sharing business and revenue models

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# Summary sheet

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| Abstract | This document presents the possible business models and legal structures for the Future Transport Cloud: 5 business model archetypes are identified and analysed. Similarly, 4 different legal structures have been identified. Finally, relevant insights and conclusions are provided. |

# Legal Disclaimer

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# Executive Summary

This document presents the results of a study of the possible business models for the Future Transport Cloud (FTC).

The FTC will provide Findable, Accessible, Interoperable and Re-usable (FAIR) data. This data will be used by the data consumers to support short term and real time decisions (transport modes organisation) and medium-term decisions (such as urban planning). The FTC will aggregate, combine, consolidate, and access data coming from different platforms (public and private transport companies, ticketing services, mapping services, weather companies, …) by ensuring that each of them can maintain or improve its business model.

After an analysis of the literature and a benchmark, **5 business model archetypes** are identified: 1) Open data and open source, 2) Two-sided (advertising or sponsorship), 3) Market place, 4) Software as a service and 5) Barter. Through interviews and workshops, these models are then analysed in terms of feasibility, attractiveness, advantages, drawbacks and pre-requisites and a comparison is established.

Similarly, **4 different legal structures** have been identified in the literature and compared through workshops: 1) Commercial entity, 2) Data Trust, 3) Joint Venture and 4) Association.

Relevant insights to be considered are the following:

- **Business models of the FTC are dynamic and agile.** The business model for the beginning is not necessarily the same than the business model for scaling the Future Transport Cloud.
- **Business models of the FTC Cloud are likely to be a mix** between several archetypal business models. Several revenue models may coexist according to the granularity and origin of data (e.g.: different revenue models for real time and historical data, raw or aggregated data). Similarly, different models may be used for accessing the data and for using the solution.
- **According to local specificities, different business models may be implemented.** Because of different local habits and local business organisations, as well as maturity level, some cities or region may use different business models for the Future Transport Cloud.
- **Business models are perceived differently according to stakeholders.** During our workshops and interviews we asked the participants to rank the business models by priority and we collected the following insights:
  - Public entities tend to favour “open source/open data” “barter” types of business models whereas commercial entities tend to favour “Marketplace” and “Software as a service”. It means that the development of the business model of the future transport cloud should be designed in collaboration to ensure alignment of interests.
  - “Two-sided” business model is the least attractive for both populations.
  - “Software as a service” is the second more attractive for both populations.
- **The business model choice is influenced by the legal entity** which will support the Future Transport Cloud. For example, if it’s a commercial entity, revenue-oriented business models will be preferred.
- We observed more consistency in the ranking of legal structure by our experts: **Association and Data Trust were favoured** by the two populations (public and private organisations).

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# Abbreviations and acronyms

| Abbreviation | Meaning |
|---|---|
| BM | Business Model |
| FTC | Future Transport Cloud |
| IPR | Intellectual Property Rights |
| SaaS | Software as a Service |

# 1. Introduction

## 1.1. Project overview

There has been an explosion of mobility services and data sharing in recent years. Building on this, the EU-funded MobiDataLab project works to foster the sharing of data amongst transport authorities, operators, and other mobility stakeholders in Europe. MobiDataLab develops knowledge as well as a cloud solution aimed at easing the sharing of data. Specifically, the project is based on a continuous co-development of knowledge and technical solutions. It collects and analyses the advice and recommendations of experts and supporting cities, regions, clusters and associations. These actions are assisted by the incremental construction of a cross-thematic knowledge base and a cloud-based service platform, which will improve access and usage of data sharing resources.

## 1.2. Purpose of the deliverable

The objective of this document is to provide a framework to support stakeholders to take advantage of the data produced from the transport network and improve their operations and services.

This document compiles a set of business and revenue models for the stakeholders interested in enhancing their data sharing products and services (especially: Data Providers, Service Providers, Governments) through the Future Transport Cloud.

The Future Transport Cloud will provide Findable, Accessible, Interoperable and Re-usable (FAIR) data. This data will be used by the data consumers to support short term and real time decisions (transport modes organisation) and medium term decisions (such as urban planning). The FTC will aggregate, combine, consolidate, and access data coming from different platforms (public and private transport companies, ticketing services, mapping services, weather companies, …).

In addition to connecting to multiple data sources, the FTC will provide additional services and features: Data standardisation and anonymization services, Data quality services, Data access services, Emission reporting, Marketplace, Automated Translation mechanisms, Knowledge base on transport data sharing issues, Catalogue of services.

## 1.3. Intended Audience

The dissemination level of D3.4 is 'Public' and contributes to the decision-making processes of stakeholders to take advantage of the transport data.

## 1.4. Structure of the deliverable and relation with other work packages/deliverables

**Section 2** presents concepts examples and benchmarks on business and revenue models.

**Section 3** describes the Future Transport Cloud business model components (data, users, value proposition, use cases, features and activities).

**Section 4** presents and analyses 5 possible business models archetypes for the Future Transport Cloud.

**Section 5** presents and analyses 4 possible legal structures for the Future Transport Cloud.

Relation with other work packages/deliverables:

- **This deliverable depends on tasks**: 2.1 (Legal and Regulatory Requirements), 3.1 (Actors' needs and cooperation framework), 3.2 (Market analysis: data sharing products and services with the highest impact) and 3.3 (Gap Analysis).
- **This deliverable will be used in tasks**: 5.2 (Quantification and measurement of the data exchange culture).

## 1.5. Methodology

The identification and analysis of possible business models for the Future Transport Cloud followed the following steps:

- **Analysis of previous tasks and deliverables of MobiDataLab**. Deliverables 2.1 (Legal and Regulatory requirements), 2.9 (Use cases) and 3.3 (Market Gap Analysis WP3 report) were used to define the scope of the Future Transport Cloud while deliverable 3.2 (Data sharing market technological developments monitoring) was used to identify possible benchmarks.
- **Literature review on data sharing business models**. Academics studies and industry reports have been analysed to identify possible business models for the Future Transport Cloud.
- **Benchmark of data sharing initiatives business models**. Examples in the mobility and outside the mobility industry of similar initiatives have been analysed to identify the possible business models for the Future Transport Cloud.
- **Interviews with stakeholders**. 11 stakeholders have been interviewed after the literature review and benchmark to establish the list of possible business models and discuss their implications.
- **Analysis and synthesis**. 2 workshops have been organised with stakeholders and consortium members to analyse the business models and their implications.

# 2. Business and revenue models: concepts and benchmark

## 2.1. Business and revenue model definition

According to (Zott, 2010), a business model is *"designed so as to create value through the exploitation of business opportunities."* A business model is composed by the value proposition, the value network and the revenue-cost model.

Many researchers and practitioners have proposed elaborated descriptions of the components of a business model. In this report, we refer to the business model canvas framework by (Osterwalder, 2010) which describes 9 building blocks of a business model represented in a canvas.

*Table 1: Business model canvas (Osterwalder & Pigneur, 2010)*

<table>
<tr><td rowspan="2">KEY PARTNERS</td><td>KEY ACTIVITIES</td><td rowspan="2">VALUE PROPOSITION</td><td>CUSTOMER RELATIONSHIP</td><td rowspan="2">CUSTOMER SEGMENTS</td></tr>
<tr><td>KEY RESOURCES</td><td>CHANNELS</td></tr>
<tr><td colspan="3">COST STRUCTURE</td><td colspan="2">REVENUE STREAM(S)</td></tr>
</table>

***Description of the 9 building blocks of the business model canvas (Osterwalder, 2010)***

- **The Value Proposition** describes the bundle of products and services that create value for a specific Customer Segment. The Value Proposition is the reason why customers turn to one company over another. It solves a customer problem or satisfies a customer need.
- **The Customer Segments** are the different groups of people or organizations an enterprise aims to reach and serve.
- **The Channels** describe how a company communicates with and reaches its Customer Segments.
- **The Customer Relationships** Building Block describes the types of relationships a company establishes with specific Customer Segments. Relationships can range from personal to automated.
- **The Revenue Streams** [1]Building Block represents the cash a company generates from each Customer Segment. Each Revenue Stream may have different pricing mechanisms, such as fixed list prices, bargaining, auctioning, market dependent, volume dependent, or yield management.
- **The Cost Structure** describes all costs incurred to operate a business model. This building block describes the most important costs incurred while operating under a particular business model. Such costs can be calculated relatively easily after defining Key Resources, Key Activities, and Key Partnerships.
- **The Key Resources** Building Block describes the most important assets required to make a business model work. Key resources can be owned or leased by the company or acquired from key partners.
- **The Key Activities** Building Block describes the most important things a company must do to make its business model work. Like Key Resources, they are required to create and offer a Value Proposition, reach markets, maintain Customer Relationships, and earn revenues.
- **The Key Partnerships** Building Block describes the network of suppliers and partners that make the business model work.

## 2.2. Data sharing and acquisition models

The Future Transport Cloud will provide Findable, Accessible, Interoperable and Re-usable (FAIR) data. This data will be used by the data consumers to support short term and real time decisions (transport modes organisation) and medium-term decisions (such as urban planning). The FTC will aggregate, combine, consolidate, and access data coming from different platforms (public and private transport companies, ticketing services, mapping services, weather companies, …).

For this reason, data sharing and acquisition methods or models are part of the business model.

Even though the value of sharing has been described by many researchers, a lot of research conclude on the difficulty to implement sharing at scale. Studies designed to understand better the

[1] we use as synonyms the two terms « revenue streams » and « revenue model »

barriers and motivations to share are useful to contribute to designing business models which would reduce the barriers and foster the motivations.

Among the **barriers to share** data are regularly mentioned strategical motives, the fear of a loss of control when data are re-used by third parties and the uncertainty about a possible harm of their business interest (Richter & Slowinski, 2019). Similar barriers have been identified in the deliverable D3.1 (Actors' needs).

When it comes to the **motivations to share**, companies accept to share data if individual benefits exceed search and transaction costs (Wysel, Baker, & Billingsley, 2021). Companies tend to follow open approaches if they have a strong interest in data-re-use (eg. If they benefit from third party services built on these data). Another reason to provide business data on a larger scale for free is to serve the public interest, this data philanthropy remains exceptional. (Richter & Slowinski, 2019). Sometimes, sharing data is a way to differentiate against competition and win a contract. For example, Via[2], which provides digital infrastructure for public transport decided early on to establish the sharing of key data indicators with public transport partners as a core element of its business model. Via has gained a competitive advantage in being selected by Los Angeles Metro as provider of the on-demand ride-sharing service (after Los Angeles Metro first partnered with another provider without reaching satisfactory agreements on trip data sharing) (described in (UITP, 2020)). Similarly, companies may be forced to share data when getting a contract by a public entity (Micheli, 2020).

This has several implications. First, a data sharing solution should either increase the benefits or reduce the transaction costs in order to increase the likelihood of sharing. Second, not all data sharing models are commercial models, and some exchanges are not directly monetised, they are settled through cooperation or barter.

As a synthesis, according to (UITP, 2020) three data sharing models exist and differ on four dimensions:

- The type of data that can be shared (data privacy, commercial constraints)
- Who can access the data (businesses, academics, public authorities …)
- Terms of use (e.g., commercial gain or research purpose)
- Terms of payment.

*Table 2: Data sharing models (UITP, 2020)*

| | Open Access | Bilateral Restricted Model | Multi Layered Restricted Model |
|---|---|---|---|
| **Type of data** | No special restrictions beyond compliance with law (e.g. privacy or competition law) | | |
| **Who can access** | No restriction beyond compliance with law | A limited set of users | |
| **Terms of use** | No or limited conditions. Could restrict data usage to non-commercial purposes | Restrictions are stipulated in agreement | |

[2] https://ridewithvia.com/


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| | | |
|---|---|---|
| **Terms of payment** | No Payment required | Payment or non-monetary reciprocal arrangements could be required, where the terms could depend on factors such as the quantity of data and its intended use. Revenue share agreements are possible |

When it comes to revenue or cooperation models, 6 are identified in the same study (UITP, 2020)

- **Free-to-all:** also known as open data.
- **Freemium**: free access to limited data or data services. Access to higher quality data or specific services is available at a cost to the data consumer.
- **Licensing**: data is shared based on licensing agreements.
- **Sponsorship/branded advertisement**: free access to data. Cost of data is subsidised by sponsors or advertisers.
- **Demand-oriented:** cost of data depends on availability and complexity.
- **Barter system**: data consumer gain access to data based on the exchange of data with data provider.

In a recent note on Data sharing in transport (European Investment Bank, 2021) 7 acquisition models of transport data by public entities are identified:

- **Public procurement of data:** a public procurement procedure is used to buy data (one-off or as-a-service procurement of a single- source dataset without advanced pre-processing by the vendor).
- **Intermediaries – integrators, aggregators and marketplaces**: urban authorities in this model call upon a third party that offers services to (pre)process data, extract information, merge data sources or interconnect systems. Marketplaces for mobility data are included in this category.
- **Financially compensated partnerships between the public and private sectors:** this model is an extension of straightforward public procurement – government and market parties collaborate and exchange on a deeper level. Such cooperation can be on a contractual basis or based on innovative procurement procedures.
- **In-kind partnerships between the public and private sectors:** public authorities have a number of assets and exploit them in exchange for commercial data, or vice versa – a private company offers data in order to receive goodwill or data in return from cities.
- **Mandatory data sharing:** in this model, urban authorities exercise their power to oblige service providers to share data in exchange of receiving certain approvals or permissions to operate in a city.
- **Collaborations between authorities:** cities work together with other (urban) authorities to exchange data, jointly procure data or build platforms, services or data standards.
- **Crowdsourcing:** urban authorities collaborate with the public to collect data and information, check or improve data quality or even outsource some of their tasks to residents.

We can conclude from these reports that data sharing occurs in diverse ways. Some sharing initiatives are triggered by incentives and other by constraints. Not all sharing initiatives are monetised and some sharing initiatives combine several schemes. The choice of a scheme appears to be highly contextual.

We synthesized the models observed in the literature for data sharing and data acquisition in 4 types**:**

- *Open data*, data are made available for free.
- *Two-sided*, data are sponsored by advertising for example.
- *Barter*, data are accessed to in exchange of other data or access to a market.
- *Software-as-a-service,* data are acquired through the subscription to a service.

## 2.3. Cloud and platforms business and revenue models

In addition to connecting to multiple data sources, the FTC will provide additional services and features: Data standardisation and anonymization services, Data quality services, Data access services, Emission reporting, Marketplace, Automated Translation mechanisms, Knowledge base on transport data sharing issues, Catalogue of services (see section 3.5 for more details).

With this scope of features, the relevant analogies for the FTC business models are data sharing platforms. When looking in the literature at the definitions of such platforms, we see a good fit with the possible scope of the FTC. For example, they are defined as “architecture allowing programmability and reuse of content and data, typically through API and organizing modularity between a stable core and variable components” (Plantin, Lagoze, & Edwards, 2018). Their tasks are described as: “organisation of the community, allocation of value both between stakeholders and between the system and community, and development of data into information” (Wysel, Baker, & Billingsley, 2021). Additionally, their core functions (Richter & Slowinski, 2019) are to “match supply and demand between data suppliers and data users, foster trust as a condition for exchange and processing of the transaction, which affects not only the data transfer but can include the remuneration.”

In the academic literature, there are numerous contributions on platform business models. A lot of them conclude on the impossibility to identify a fixed list of business models but rather categories and dimensions or components. For example, (Mallon, 2021) identify 109 business model components of digital platform business models.

However, some research present interesting and useful typologies for the scope of our research, in particular,(Schweiger, 2016) differentiates data sharing platforms between three categories:

1. **The Integrator Platform** is located strategically between external innovators (for example application developers in the AppStore) and the customers. This gives the platform owner a large amount of control over the goods and services that are traded on his platform and the way business is conducted. Apple’s App Store [3]is one example of such an integrator platform.

2. Less control rights are granted in the **Product Platform**, where the platform owner offers a foundation for so-called external innovators to build upon. These innovators sell their products directly to the customers, which makes it difficult for the platform owner to guarantee certain standards in the products.

[3] https://www.apple.com/app-store/


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3. The third business model category is a **Two-Sided Platform**. Both, customers, and external innovators are linked to the platform even though they conduct their business directly with each other.

In terms specifically of revenue models, two broad categories are identified in the literature (Su, 2021): **the service-fee-based revenue model and the advertising-based revenue model**. The service-fee-based revenue model is intended to provide consumers with products and services and collect purchase fees (i.e., service fees). By comparison, revenue is directly raised from third party advertisers instead of users in the advertising-based revenue model.

More precisely (Staub, 2021) identifies four possible revenue models in digital platforms:

- Commissions
- Subscription
- Advertising
- Service sales

We synthesized the models observed in the literature in 3 types:

- *Market place*, the platform takes a commission on the transactions taking place between platform users
- *Two-sided,* access to the service is for free for the users and the platform is funded through advertising
- *Software-as-a-service,* the platform is paid by the users through a subscription service

During interviews and workshops, we used the models synthesized previously and each stakeholder and expert has confirmed them. The 5 archetypal business models relevant for the Future Transport Cloud context are:

- Open data and open source
- Two-sided (advertising or sponsorship)
- Market place
- Software as a service
- Barter

## 2.4. Benchmark analysis

To get a better vision on the possible business models for the FTC, we made a benchmark of existing platforms and solutions. We benchmarked companies in the mobility environment and in other business contexts and we structured the benchmark on 4 main items: ownership, openness, industry scope and business model.

The first three items have been identified in the literature as parameters to differentiate platforms (Richter & Slowinski, 2019) and each have an impact of the revenue models implemented:

- **Ownership**: is the platform owned by the company who has the data or by a third party. In the first case, the digital services are either offered to support the sales of the device generating

the data or sold on a subscription model. In the latter case, freemium, subscription and commission on transaction are observed.

- **Degree of openness to new participants**: closed to a few partners or widely opened (data pooling vs closed platforms vs marketplaces vs data sharing clubs).
- **Industry scope**: limited to one or intra-industries.

The fourth item for our benchmark is the typology we built in the previous section concluding in 5 archetypal business models.

From the benchmark provided in deliverable D3.2 of the 37 different service, products and platforms of mobility, data, we selected solutions comparable to the scope of the FTC and benchmarked them (results are presented in the table below).

*Table 3: Benchmark of solutions inside mobility industry*

| Company | Ownership | Openness | Industry Scope | Business model |
|---|---|---|---|---|
| Mobi-iti https://www.okina.fr/opendata/ | Third Party | Widely Open | Limited to one | Open Source |
| AKKA Data Hub https://akkadatahub.com/ | Unavailable | Widely Open | Multiple Industries | Software as a service |
| CKAN https://ckan.org/ | Unavailable | Widely Open | Multiple Industries | Open Source |
| Here https://www.here.com/platform | Self-owned & Third Party | Widely Open | Limited to one | Software as a service and Marketplace |
| Otonomo https://otonomo.io/ | Third Party | Widely Open | Limited to one | Software as a service and Marketplace |
| OpenDataSoft https://www.opendatasoft.com/ | Third Party | Widely Open | Limited to one | Software as a service and Marketplace |
| Geotab https://data.geotab.com/ | Self-owned & Third Party | Widely Open | Limited to one | Software as a service and Marketplace |
| Fluctuo https://fluctuo.com/ | Third Party | Closed Platforms | Multiple Industries | Service Based |
| Inrix https://inrix.com/ | Third Party | Closed Platforms | Limited to one | Service Based |

In the agricultural industry, companies like D Just Connect which have been funded by European Union were also originally started as a research project. Companies like Agco have created data sharing platforms (Fuse) in complement to the existing products they sell as well as to connect third party applications. Majority of the data sharing platform companies in this industry have multiple sources of income (selling products/services).

Data Sharing Platform in healthcare industry is increasing rapidly. Majority of the organisations, like Vivli and Open Humans, are non-profit organizations. While Vivli also provides a data repository, Open Humans provides options for community self-research for individuals and communities. Health Data Hub on the other hand charges subscription fee and offers other services along with providing a data sharing platform.

Port Industry highly practices data sharing and Nxt Port charges subscription fees from their clients. Their main costs include platform maintenance and cybersecurity costs. Data Port is very similar to MobiDataLab as it has been funded by the EU as well and is planned on being monetized at a later stage.

*Table 4: Benchmark of solutions outside mobility industry*

| Company | Industry | Data Ownership | Openness | Industry Scope | Business model |
|---|---|---|---|---|---|
| D Just Connect https://www.djustconnect.be/ | Agriculture | Third Party | Closed Platform | Limited to one | Marketplace |
| Agco's Fuse https://www.fusesmartfarming.com/ | Agriculture | Third Party /Self Owned | Widely Open | Limited to one | Software as a service and Marketplace |
| Vivli https://vivli.org/ | Healthcare | Third Party | Widely Open | Multiple Industries | Marketplace |
| Open Humans https://www.openhumans.org/ | Healthcare | Third Party | Widely Open | Multiple Industries | Open Source |
| Health Data Hub https://www.health-data-hub.fr/ | Healthcare | Third Party | Widely Open | Multiple Industries | Open Source |
| FENIX https://fenix-network.eu/ | Logistics | Unavailable | Unavailable | Limited to one | E.U Funded (50%) |
| Data Ports https://dataports-project.eu/ | Port | Third Party | Closed Platform | Multiple Industries | E.U Funded |
| Nxt Port https://www.nxtport-international.com/ | Port | Third Party | Closed Platform | Limited to one | Software as a service and Marketplace |

**We can conclude from this benchmark that a lot of organisations use several of the business model archetypes we identified in the literature and the design of the business model of the Future Transport Cloud should not be limited to choosing one or another business model but may also result in a combination of several of them.**

# 3. Future Transport Cloud business model components

The description which follows summarizes the outcomes of the previous tasks of the project, in particular T3.1 on actors needs and T3.3 on gap analysis. It should not be interpreted as a final specification but more as a current vision of the Future Transport Cloud.

The Future Transport Cloud will provide Findable, Accessible, Interoperable and Re-usable (FAIR) data. This data will be used by the data consumers to support short term and real time decisions (transport modes organisation) and medium-term decisions (such as urban planning). The FTC will

aggregate, combine, consolidate, and access data coming from different platforms (public and private transport companies, ticketing services, mapping services, weather companies, …).

As a matter of fact, the living labs which will take place during Work Package 5 and the hackathons, datathons and codagons will represent major opportunities to adjust the scope and description of the FTC.

It is then very likely that an update of the possible business models will be necessary when Work Package 5 ends. That is why the main objective of this task is to provide a framework for analysing the possible business models rather than defining the FTC business models. This task will be realised in the exploitation plan of the project (Work Package 5) when the results of the living labs and user's surveys on the FTC and its business models are available.

## 3.1. Data supported

The list of data supported by the Future Transport Cloud has been identified using previous reports' lists, in particular the data identified in the Data Stakeholder framework by (WBCSD, 2020).

*Table 5: List of data included in the Future Transport Cloud*

| Data managed |
|---|
| Vehicle location |
| Environment |
| Cartographic |
| Payment |
| Vehicle usage |
| Static Infrastructure |
| Dynamic infrastructure |
| Ticketing |
| User-generated |

## 3.2. Users of the Future Transport Cloud

The main users of the Future Transport Cloud are Public Administrators, Public Transport Operators, Mobility Service Providers, Government Transportation Providers, Information Service Providers, and Public Transport Authorities. The existence of the future Transport Cloud will also benefit stakeholders from other industries such as healthcare, energy, tourism, insurance, advertising, real estate, urban planning, and telecommunications. The future Transport Cloud will target a diverse group of users who will be the primary beneficiaries of the value proposition. The following are predicted to be the main stakeholder categories for the future Transport Cloud:

- **Main data consumers**: government officials, public transportation authorities, private and public transportation operators.
- **Main data suppliers:** Private and Public transportation operators and government transportation providers.

- **Service providers**: Information Service Providers and Analytics Service Providers
- **Other users of the Future Transport Cloud**: Entrepreneurs, start-ups, SMEs, corporations from other industries (healthcare, energy, tourism, insurance, advertising, real estate, urban planning, and telecommunications), researchers, cities.

## 3.3. Use cases

The following 8 use cases have been identified (see deliverable D2.9 on Use cases for more details):

- **Optimization of Transport flow and ETA**: In this use case, influencing data for computing Estimated Time of Arrival (ETA) is analysed. ETA is highly relevant in optimising, monitoring, and managing transport flow. Arrival time is dependent on huge number of parameters. It is particularly challenging to estimate in road transport and intermodal transport due to the decentralised nature of the transport infrastructure. Estimating the arrival time requires combining a large number of static and dynamic data sources using state of the art data processing techniques.
- **Emission reporting**: Reducing environmental impact is highly relevant for any form of mobility and transport. Working towards environmentally friendly and sustainable mobility is highly dependent on traceable and reproduceable measures. Emissions reporting is both used to understand where there is greatest potential for reducing emissions as well as during the planning for comparing different planning choices. Furthermore, reporting emission makes stakeholders accountable for their emissions and serves that way as incentive for reducing them.
- **Analytics and learning**: The use case “analytics and learning” is a generic use case in which tools are developed, extended, and reused to analyse existing and newly integrated data. The focus of this use case is related to Data access, Data analysis, Learning from data. This use case is providing a horizontal connection to all use cases, since analysis and learning methods can contribute to most of the presented use cases.
- **Re-use of transport data for journey planners / digital services**: Many digital service providers would like to be able to add journey planning capabilities to their services, using different modes of transports. Such services obviously include transport applications (multi-modal transport), but also other type of services, for example: city applications (points of interest), retail applications (how to get to a physical store with public transport), real estate (public transport travel time, optimisation of commute time from home to office), employment (list of job offers with travel optimisation), ride sharing (help commuters to connect for sharing the same vehicle) and many more.
- **Mobility as a service**: Mobility takes new forms, with new behaviours and new services – especially in urban areas. With mass transit as backbone and integrated to the new services, mobility becomes a mixture of different modes of transport, both individual transport solutions (either cars, bicycles, e-scooters, etc.) and new forms of public transport like ride pooling and ridesharing. In order to motivate users to use and mix these different modes of transport, it is important to offer them a complete end to end solution that will not only allow them to plan their journey, but also to book and pay their ticket for the complete journey. These features, when combined (plan, book, and pay for multiple types of mobility services using a single channel) constitute the core principles of the Mobility as a Service (MaaS) use case.
- **Geodata sharing applied to Transport: OpenStreetMap for inclusive transport.** The lack of information about accessibility makes it hard for people who use a wheelchair or move around

with strollers to take part in the daily life. Regulations in EU member states declare that local public transport must be usable for people with limited mobility possibilities (e.g. the German law for Barrier-free Travel Chain). In this context, public transport authorities are requested to examine all train stations and bus stops with respect to accessibility to disabled persons, providing detailed mapping of train stations and bus stops including infrastructure, P+R, B+R, vehicle sharing, etc. These kinds of projects, organisations and initiatives aim to improve significantly the daily life of citizens with limited mobility.

- **Geodata sharing applied to Transport: Environmental data for sustainable transport:** This use case aims at exposing a combination of data provided by the public (transport) authorities of the Reference Group with local environmental data (air quality, atmospheric conditions, weather, etc.) following the Geographical Information Systems formats and exchange standards (OGC, INSPIRE (Eu, 2007), GeoJSON (rfc7946, no date), open APIs, etc). These data can be static (e.g. low emission zones), real-time (e.g. road traffic and and/or historical. The result of this analysis could be e.g. a geographical representation of the environmental impact of road traffic in a given territorial context.
- **Transport data sharing within the Linked Open Data vision.** Digital technologies in general and data exchange in particular have an important role to play in improving tourist mobility. Especially when planning their trip and during their travels on site, visitors need good travel information, for which it is crucial to be able to combine transport and tourism related information. Local authorities that organise tourism in their area (e.g. tourist offices) would gain a lot from integrating all available mobility services, if possible in real time, with their data - especially to improve the tourist information they provide (e.g. with car parks, public transport services, tourist buses, and even data from bike sharing companies). On the other hand, mobility organising authorities could be more efficient if they could integrate tourist information into their passenger information systems - for cities and regions that are tourist destinations in particular. For the latter case, considering tourists as a specific category of transport users is a necessity, as -contrary to residents - they are not familiar with the area and the available transport services (and do not even know how they work), they follow different travel patterns, do not need to travel at peak times, and they often do not speak the language.

## 3.4. Value propositions

**The main value proposition of the Future Transport Cloud is to *Access to FAIR data to make better decisions and develop services*.** The Future Transport Cloud will provide Findable, Accessible, Interoperable and Re-usable (FAIR) data. This data will be used by the data consumers to support short term and real time decisions (transport modes organisation) and medium-term decisions (such as urban planning). In addition, digital services such as journey planners could use the data in their services to make them more complete or relevant.

The prospective business model will allow numerous actors to save money by accessing shared data in a secure setting, eliminating the gap created by present asymmetric information circumstances. It will facilitate business collaboration amongst stakeholders by establishing a framework in which public and private actors, both small and large, can network and benefit from the collaborative atmosphere and opportunities that the federation provides. All major stakeholders in the data-sharing culture will benefit from the future Transport Cloud, including:

- **Data consumers** will be aided in resource allocation decision-making by having access to reliable, traceable, real-time, and historical mobility data, as well as a connection to a trusted pool of experts to whom they may ask specific questions.
- **Data suppliers** will gain from increased visibility and distribution of their services, such as Public Transportation Operators and Mobility Service Providers.
- **Innovators** will be able to improve their operations and expand their business.
- **Data providers**, such as Public Transport Operators and Mobility Service Providers, will get benefit by having a better exposure and distribution of their services.
- **Researchers** will benefit from the access to a secure and reliable data source for knowledge development.

## 3.5. Main features

The FTC will aggregate, combine, consolidate, and access data coming from different platforms by ensuring that each of them can maintain or improve its business model. Therefore, a connectivity framework between the platforms willing to be federated to the Future Transport Cloud is a key resource to offer to users.

This involves:

- **The technical connection system between databases**. The Transport Cloud will aggregate, combine and merge heterogeneous data.
- **Data standardisation and anonymization services.**
- **Data quality services:** Open-source tools will be created to validate datasets and guide producers on how to improve them and grading schemes to assess the quality of data beyond automatized validation.
- **Data access services.** The future transport data will offer specific on-demand mobility information, addressed to specific actors, including those that do not belong to the transport sectors, such as real estate companies, health care and tourism companies. The future Transport Cloud should foster the use of transport data through a common service layer (i.e. unified API) based on the Transmodel concepts and data structure. Navitia (www.navitia.io/) or Open Trip Planner (OTP, www.opentripplanner.org/) could be a starting point for defining this API.
- **Emission reporting**: The future Transport Cloud will develop micro services for emissions calculation. For instance, in addition to compute a travel plan, the services could also compute estimated emission. This can be predicted emissions (e.g., routing) or emission that have already taken place (e.g., tracking, route matching).
- **Marketplace** where demand and supply of transport data occurs, but also where members (or users in general) can ask for specific data, information, study. The marketplace may also allow the offering and/or demand of personalized, on demand services between stakeholders.
- **Automated Translation mechanisms** to allow users to communicate.
- **Knowledge base on transport data sharing issues** (e.g. the data analytics or other studies provided by researchers, the transport related information provided by transport authorities).
- **Catalogue of services offered by the platforms that are members of the FTC**, so that users know where to get the service they want and platforms have a place where “advertise” their service offering.

## 3.6. Core activities

The governance structure of the Future Transport Cloud shall be defined by including roles aiming to establish, define, and enforce the strategies for identification and access to data, as well as ensuring that services are compliant with the existing regulatory environment.

Then the main core activities will be:

- **Platform technical performance monitoring:** data connectivity framework, marketplace management.
- **Users' support.**
- **Data quality management and control**: standards definition, "certification" mechanisms, grading system of the catalog of services, regulation and legal.
- **Partnership management:** "catalogue of services" population, members and users onboarding.
- **Create new value propositions development for stakeholders considering evolution of regulation and privacy**

In addition to these core activities, additional activities are required for the general management and administration of the Future Transport Could. Other activities supporting the FTC are related to the management and promotion of the FTC:

- **Management and coordination of the Future Transport Cloud activities,** including budget monitoring and control.
- **Communication and collaboration** with external stakeholders and members.

# 4. Possible business models for the Future Transport Cloud

From the literature review and the benchmark (see 2 Business and revenue models: concepts and benchmark) we concluded on possible business models archetypes for the FTC. Then, previous tasks of the project were synthesized to define the envisioned scope of the FTC and various blocks of its business models.

We present hereafter the results of interviews with stakeholders, meetings with WP3 consortium members and workshops with stakeholders about the FTC possible business models (see appendix).

Firstly, we describe the common blocks of all 5 archetypal business models. Secondly, we present an analysis of each of the 5 archetypal business model identified in terms of feasibility, attractiveness, advantages, drawbacks, and pre-requisites. Last, a comparison of the 5 models is presented and discussed.

## 4.1. Business models common blocks

Each model will be described and then presented in the Business Model Canvas framework (see Table 1: Business model canvas (Osterwalder & Pigneur, 2010)). As the main objective is to compare the business models, the general and common components to all have been excluded for clarity of the comparison. For example, all business models may consider some human resources cost linked to overall management.

Below are presented some common building blocks of all models.

**Value proposition:**

*Access to FAIR data to make better decisions and develop services*: the Future Transport Cloud will provide Findable, Accessible, Interoperable and Re-usable (FAIR) data. This data will be used by the data consumers to support short-term and real time decisions (transport modes organisation) and medium-term decisions (such as urban planning). In addition, digital services such as journey planners could use the data in their services to make them more complete or relevant.

**Customer segments and key partners:**

- *Data consumers:* government officials, public transportation authorities, public transportation operators, private transportation operators, researchers, SMEs and start-ups.
- *Data suppliers*: Public transportation operators, private transport operators, government transportation providers, mapping services
- *Service providers*: Information Service Providers and Analytics Service Providers.

**Key resources**

- *Platform*: Technical connection system between databases, Data anonymization services
- *Knowledge base*: Knowledge base on transport data sharing issues
- *Catalogue*: Catalogue of services offered by the Future Transport Cloud members

**Key activities:**

- *Platform technical performance monitoring***:** data connectivity framework, marketplace management.
- *Users' support.*
- *Data quality management and control:* standards definition, "certification" mechanisms, grading system of the catalog of services, regulation and legal.
- *Partnership management:* "catalogue of services" population, members and users onboarding.

As a synthesis, are presented below the common blocks of the FTC business model, using the business model canvas. The options for the blocks left blanks will be specified in the next section.

<table>
<tr><td rowspan="2">KEY PARTNERS<br><br>Data providers<br>Service providers</td><td>KEY ACTIVITIES<br>Platform technical maintenance and monitoring<br>Users support<br>Data quality control<br>Community management</td><td rowspan="2">VALUE PROPOSITION<br>Access to FAIR data to make better decisions and develop services<br><br>Increase visibility of services</td><td rowspan="2">CUSTOMER RELATIONSHIPS<br><br>CHANNELS<br>Future transport cloud portal<br>APIs</td><td rowspan="2">CUSTOMER SEGMENTS<br>Data consumers<br><br>Data providers</td></tr>
<tr><td>KEY RESOURCES<br>Data & teams<br>Platform, catalogue, knowledge base</td></tr>
<tr><td colspan="3">COST STRUCTURE</td><td colspan="2">REVENUE STREAMS</td></tr>
</table>

## 4.2. Archetypal business models analysis

This analysis is a synthesis of literature review, interviews and workshop held with stakeholders (see 1.5 Methodology and 7 Appendix).

### *4.2.1. Open source & open data*

The first archetype business model would be a blend of open data and open source where all the data is made available without financial compensation. The software is maintained by staff from the platform stakeholders on a donation mode (data users, service providers, …). Like in other open source projects, other contributors could voluntarily join the team's effort even and contribute to the software maintenance.

In this model, data providers and analytics service providers would not be compensated financially for providing the data or digital service. Data users would not pay for using the platform. The incentive for stakeholders to allocate some resources which would benefit to all would be to benefit from data and platform for a limited amount of resource.

**Examples**: Navitia (www.navitia.io/) or Open Trip Planner (OTP, www.opentripplanner.org/), CKAN

<table>
<tr>
<td rowspan="3">KEY PARTNERS<br>Data consumers<br>Data providers<br>Service providers</td>
<td>KEY ACTIVITIES<br>Platform technical maintenance and monitoring<br>Users support<br>Data quality control<br>Community management</td>
<td rowspan="2">VALUE PROPOSITION<br>Access to FAIR data to make better decisions and develop services<br><br>Increase visibility of services</td>
<td>CUSTOMER RELATIONSHIPS<br>Community based</td>
<td rowspan="3">CUSTOMER SEGMENTS<br>Data consumers<br><br>Data providers</td>
</tr>
<tr>
<td>KEY RESOURCES<br>Data & teams<br>Platform, catalogue, knowledge base</td>
<td>CHANNELS<br>Future transport cloud portal<br>APIs</td>
</tr>
<tr>
<td colspan="2">COST STRUCTURE<br>No direct cost: the data is provided for free and maintenance of the platform is made through time donation from the data consumers</td>
<td colspan="2">REVENUE STREAMS<br>No direct revenue: the platform and data are accessible for free</td>
</tr>
</table>

| | |
|---|---|
| Feasibility | • Highly feasible for cities which are obliged to provide data to national access points (Directive 2010/40).<br>• Some organisations are migrating away from open source solutions.<br>• IT teams are limited in data providing companies, which limits the availability for allocating time (in particular for Data quality control tasks)<br>• Not suitable for MaaS projects |
| Attractiveness | • Highly accessible for all types of organisations<br>• More attractive for research users, less for businesses.<br>• More suitable for restricted data sets (not API): like UBER Movement |
| Advantages | • Easier evolution of the platform, more possibility to develop innovative services leveraging a diverse ecosystem (start-ups, corporations, citizens, public transport companies, governments, …)<br>• Low direct cost |
| Drawbacks | • No financial incentives for the data providers<br>• Expansion and development dependent on the agenda determined by the community and the availability of resources to implement them<br>• Cost of data quality unlikely to be covered by contribution |
| Pre-requisites | • A significant group of data consumers and providers willing to provide sufficient resources (data and team)<br>• A governance body connected and supported by a major open source / open data foundation<br>• Shared data standards and legal framework for data sharing (what to share, what usage rule)<br>• Additional services on top of open data to provide value to users |

## 4.2.2. Two Sided (advertising, sponsorship)

This type of business model is like social networks and search engines. It is for free for the users, but the platform is financed by advertisements or sponsorships. However, the marketing costs in the two-sided business models run high to raise awareness of the organization.

In this model, the data consumers access the data for free, the data providers are compensated financially for the data, as the analytics service providers for the digital services included in the platform. **Examples**: Facebook and Google for two sided.

<table>
<tr>
<td rowspan="2">KEY PARTNERS<br>Analytics service providers</td>
<td>KEY ACTIVITIES<br>Platform technical maintenance and monitoring<br>Users support<br>Data quality control<br>Marketing and partnership management</td>
<td rowspan="2">VALUE PROPOSITION<br>Access to FAIR data to make better decisions and develop services<br>Communicate to targeted audience<br>Collect revenues</td>
<td>CUSTOMER RELATIONSHIPS<br>Network effects</td>
<td rowspan="2">CUSTOMER SEGMENTS<br>Data consumers<br>Sponsors, advertisers, marketers<br>Data Providers</td>
</tr>
<tr>
<td>KEY RESOURCES<br>Data, Platform, catalogue, knowledge base</td>
<td>CHANNELS<br>Future transport cloud portal<br>APIs<br>Transport applications</td>
</tr>
<tr>
<td colspan="3">COST STRUCTURE<br>Platform maintenance, user support, data, analytics services<br>Marketing and partnerships</td>
<td colspan="2">REVENUE STREAMS<br>Data consumers access for free<br>Advertising / sponsorship revenue is collected</td>
</tr>
</table>

| | |
|---|---|
| Feasibility | • Higher in context of MaaS or of PPP cooperation |
| Attractiveness | • Advertising-based model is less trusted by citizens and public organisations are reluctant to support them |
| Advantages | • Highly scalable model<br>• Financial incentive for the data and service providers |
| Drawbacks | • High marketing costs to gain sufficient usage<br>• If successful, may lead to market concentration and platform dominance<br>• Risk that big sponsoring players have an unfair advantage in data access<br>• Highly competitive advertising market |
| Pre-requisites | • Ability to prove the impact of advertising on the audience<br>• Significant volume to capture enough revenue to cover the costs<br>• Onboarding of major data providers from the beginning (=> which incentive?)<br>• Transparency on the rules and the advertising policies |

### 4.2.3. Marketplace

A data marketplace is a service that allows users to buy and sell data. If the data is used to support a transaction, for example, selling a ticket or booking an Uber ride, then the platform would take a commission on the transaction, which would be one way of sustaining the platform.

In this model, the costs of running the platform are balanced by the commission the platform takes on each transaction between data providers and sellers. Data consumers pay data producers for the data and analytics services providers are paid for their digital services. **Examples**: HERE, Moovit, One Transport

<table>
<tr><td rowspan="2">KEY PARTNERS<br>Analytics service providers<br><br>Payment processors</td><td>KEY ACTIVITIES<br>Platform technical maintenance and monitoring<br>Users support<br>Data quality control<br>Marketing and PR</td><td rowspan="2">VALUE PROPOSITION<br>Access to FAIR data to make better decisions and develop services<br><br>Collect revenues</td><td>CUSTOMER RELATIONSHIPS<br>Network effects</td><td rowspan="2">CUSTOMER SEGMENTS<br>Data consumers<br><br>Data Providers</td></tr>
<tr><td>KEY RESOURCES<br>Platform, catalogue, knowledge base</td><td>CHANNELS<br>Future transport cloud portal<br>APIs<br>Transport applications</td></tr>
<tr><td colspan="3">COST STRUCTURE<br>Platform maintenance, user support, analytics services<br>Marketing and partnerships</td><td colspan="2">REVENUE STREAMS<br>Commission on every transaction</td></tr>
</table>

| | |
|---|---|
| Feasibility | • Well fitted business model in MaaS context |
| Attractiveness | • Attractive value proposition for all customer segments |
| Advantages | • Open for small consumers<br>• Highly scalable model<br>• Financial incentive to share: data revenue and transport services revenues<br>• Easier to navigate from a legal perspective as it already exists on the market<br>• Ensures transactions transparency and funds data quality |
| Drawbacks | • Higher technical complexity and higher infrastructure costs to ensure the proper service level<br>• Threshold effects (easier for big cities)<br>• Public procurement processes could make this model impractical for public authorities as customers |
| Pre-requisites | • High number on both sides of the market place to ensure liquidity<br>• Onboarding of major data providers from the beginning (=> which incentive?)<br>• Clear transaction to take a commission on |

## 4.2.4. Software as a Service

In this business model users are charged a licence fee or software as a service fee. The fees charged vary according to the usage by the client. The servers, databases (and the data they hold), and other tools that allow their product to be accessed and used are all under the control of the SaaS provider.

In this model, the data providers and analytics providers get financially compensated for their data and services and the consumers pay a subscription for accessing the data and platform. The main difference with the marketplace model is that a unique subscription model is designed for all consumers, whereas in the marketplace model each data transaction is organised independently.

**Examples**: ArcGIS, Carto, Inrix, MapBox, Otonomo

<table>
<tr>
<td rowspan="2">KEY PARTNERS<br>Data providers<br>Service providers</td>
<td>KEY ACTIVITIES<br>Platform technical maintenance and monitoring<br>Users support<br>Data quality control<br>Marketing and Sales</td>
<td rowspan="2">VALUE PROPOSITION<br>Access to FAIR data to make better decisions and develop services</td>
<td>CUSTOMER RELATIONSHIPS<br>Network effects</td>
<td rowspan="2">CUSTOMER SEGMENTS<br>Data consumers</td>
</tr>
<tr>
<td>KEY RESOURCES<br>Platform, catalogue, knowledge base</td>
<td>CHANNELS<br>Future transport cloud portal<br>APIs</td>
</tr>
<tr>
<td colspan="3">COST STRUCTURE<br>Platform maintenance, data, analytics services<br>User support, Marketing and sales</td>
<td colspan="2">REVENUE STREAMS<br>Subscription fee</td>
</tr>
</table>

| | |
|---|---|
| Feasibility | • More suitable for private companies compared to public organizations<br>• Difficult business model for public organization |
| Attractiveness | • High willingness to pay the service from cities, but low if the data is sold (too expensive)<br>• Strong value proposition: One-stop-shop solution and integration<br>• Highly attractive for small communities who cannot develop specific solutions |
| Advantages | • Highly scalable model<br>• Low subscription fee could be charged for start-ups<br>• Easier to navigate from a legal perspective as it already exists on the market |
| Drawbacks | • SaaS might be expensive for government.<br>• Subscription fee may be too high for small cities<br>• Reduced flexibility in the evolutions of the services |

| | |
|---|---|
| Pre-requisites | • 3 to 5 years contract to ensure financial viability<br>• Importance to know the use cases to define the pricing mechanism of the subscription fee<br>• Common ground on technical and financial basis<br>• Clear IPR rules and partners agreements<br>• Public procurement rules and processes need to be considered |

## *4.2.5. Barter*

In this business model, some organization would provide some data and in exchange receive the right to operate, which is more of a constraint than an incentive. This type of business model is highly unusual and often practiced in collaboration with other business models. It is also more suitable for large organisations, making it often an avoidable amongst start-ups and SME's. Determining and concluding upon a common value of data between two or more parties participating is often a big issue.

In this model, consumers access data without paying and data providers are not compensated financially. The running costs of the platform (which do not include the cost of data provided by the partners) are funded through a subscription paid either by the data consumers or by the providers.

<table>
<tr><td rowspan="2">KEY PARTNERS<br>Data providers<br>Analytics service providers</td><td>KEY ACTIVITIES<br>Platform technical maintenance monitoring<br>Users support<br>Data quality control<br>Partnership management</td><td rowspan="2">VALUE PROPOSITION<br>Access to FAIR data to make better decisions and develop services<br>Access to new markets</td><td>CUSTOMER RELATIONSHIPS<br>Customized</td><td rowspan="2">CUSTOMER SEGMENTS<br>Data consumers<br>Data Providers</td></tr>
<tr><td>KEY RESOURCES<br>Data<br>Platform, catalogue, knowledge base</td><td>CHANNELS<br>Future transport cloud portal<br>APIs</td></tr>
<tr><td colspan="3">COST STRUCTURE<br>Platform maintenance, analytics services<br>Marketing and partnerships</td><td colspan="2">REVENUE STREAMS<br>Data consumers access for free<br>Data providers or consumers pay a subscription fee</td></tr>
</table>

| | |
|---|---|
| Feasibility | • High (For micro mobility industry)<br>• Multiple bilateral agreements reduce feasibility |
| Attractiveness | • High (For micro mobility industry) |
| Advantages | • Reduced direct cost for the data consumers |

| | |
|---|---|
| Drawbacks | • Difficult scaling as a lot of different bilateral agreements need to be implemented<br>• Favours large corporations who have a lot to share, not ideal for SMEs and start-ups |
| Pre-requisites | • Concessions agreement which would include data sharing clause |

## 4.3. Business models comparison

Based on the previous analysis, to compare the business models, we used the following criteria:

- **Scalability**: How easy or difficult is it to scale the business model.
- **Implementation speed and cost**: how expensive and long is the model to start.
- **Openness**: To what extent the model includes a wide variety of stakeholders (e.g. start-ups and corporations and research institutions, small and big cities, …).
- **Financial incentives for private companies:** how significant are the financial incentives for private companies to join the model.
- **Attractiveness for public entities:** how attractive the model is for public entities (cities, governments, public transport authorities).
- **Technical complexity:** how complex is the model from a technical perspective**.**

*Table 6: Comparison of the 5 business models archetypes*

| Structure | BM1 open data open source | BM2 advertising | BM3 Market place | BM4 SaaS | BM5 Barter |
|---|---|---|---|---|---|
| **Scalability** | Medium | High | High | Medium | Low |
| **Implementation speed and costs** | Medium | High | Medium | Medium | Low |
| **Openness** | High | Medium | Medium | Medium | Medium |
| **Financial incentives for private companies** | Low | Medium | High | High | Low |
| **Attractiveness for public entities** | Medium | Low | Medium | Medium | High |
| **Technical complexity** | Low | High | High | Medium | Low |

**This comparison of business models archetypes illustrates that the choice of one or another may also be influenced by some implementation concerns. It also highlights some possible paths: starting with a low resource intensive model and then evolve towards a more resource intensive one. Lastly it may reveal possible combinations of business models archetypes which would offer symmetrical interests.**

# 5. Future Transport Cloud Legal structure

Early in the process of the study we concluded that the choice of a business model is strongly influenced by the legal structure which supports the FTC. For this reason, we decided also to address that question in the scope of the possible business models for the FTC. We first synthesized the literature and then gathered experts' opinions during the workshops.

The literature review as the benchmark enabled us to identify 4 possible legal structures for the FTC:

- **Commercial entity**: for-profit organisations collecting revenues from selling services to clients to finance their activities.
- **Data trust**: The Open Data Institute defines a data trust as a legal structure that provides independent stewardship of data. The definition is taken from the concept of a 'legal trust' and applied to data (see Figure 1: Overview of the Data Sharing Ecosystem Overseen by a Data Trust (UITP, adapted from ODI, 2019)and
- Table 7: Truata, an example of Data Trust)
- **Joint venture**: for-profit organisation supported and owned by several commercial entities.
- **Association**: usually not-for-profit organisation, funded by public funding or individuals contributions.

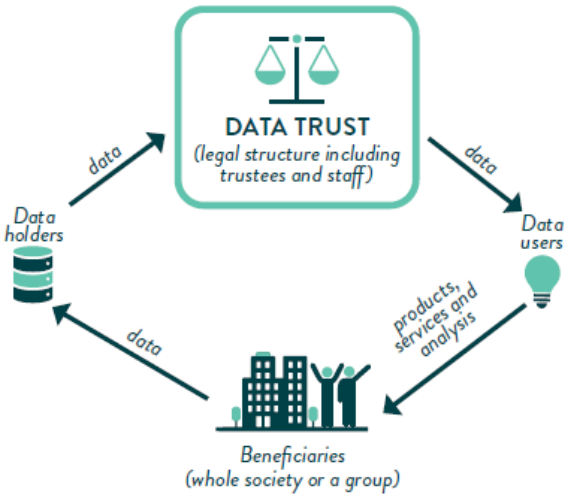


*Figure 1: Overview of the Data Sharing Ecosystem Overseen by a Data Trust (UITP, adapted from ODI, 2019)*

*Table 7: Truata, an example of Data Trust*

| |
|---|
| *Named by the media as the first European data trust and established by Mastercard and IBM in response to the EU General Data Protection Regulation (GDPR), Truata serves as a platform with restricted access to data. This means that companies that hold data from individuals can use the Truata platform for data management, anonymisation, storage and analytics in compliance with the GDPR. (In (UITP, 2020))* |

The synthesis of the insights gathered during the experts' workshops is presented below:

*Table 8: Advantages and drawbacks of the 4 possible legal structures*

| Structure | Advantage | Drawbacks |
|---|---|---|
| **Commercial entity** | • Clear incentive for private companies<br>• Streamlined governance and a single vision drives the approach (can also be a drawback) | • Not well adapted for open data<br>• Lack of trust<br>• The structure can be purchased<br>• Potential competitive implications should this favour a certain commercial entity |
| **Data trust** | • Trustors are assured that public actors are capable of keeping their personal data or confidential business information safe and secure | • Might end up being exclusive or perceived as exclusive. This would not sit well with public authorities except in specific cases involving sensitive data<br>• Challenges in finding a consensus |
| **Joint venture** | • The risk is shared among stakeholders<br>• Can combine partners with complementary roles and responsibilities | • Complicated to set up, need to find several partners interested in joining the JV<br>• Limited to commercial entities<br>• Partner Agreement is challenging to be reached due to IPR |
| **Association** | • Can be sided by a linked "for-profit" entity<br>• Easier to trust for data consumers, in particular non-profit organisation like GAIA- X<br>• If public authorities are the drivers behind the formation of an association, private sector is likely to follow<br>• Bringing all stakeholders to the table fosters agreed data standards and rules | • As not for profit, it may be more difficult to convince private partners to get engaged<br>• The collaborative decision-making process may imply longer times<br>• Initial complexity to identify, convince and align partners |

# 6. Conclusion

We will conclude with insights on the FTC business models, on the legal structure for the FTC and recommendations for the next steps of the project.

*Insights on Business Models for the Future Transport Cloud*.

As previously said, our goal in this study is not to define the business model of the Future Transport Cloud but more to provide an analysis to the stakeholders in the ecosystem to develop a specific business model. We can conclude on 4 main insights:

- **Business models of the Future Transport Cloud are dynamic and agile.** The business model for the beginning is not necessarily the same than the business model for scaling the Future Transport Cloud.
- **The business model of the Future Transport Cloud is likely to be a mix** between several archetypal business models. In particular, several revenue models may coexist according to the granularity and origin of data (e.g.: different revenue models for real time and historical data, raw or aggregated data). Similarly, different models may be used for accessing the data and for using the solution.
- **According to local specificities, different business models may be implemented.** Because of different local habits and local business organisations, as well as maturity level, some cities or region may use different business models for the Future Transport Cloud.
- **Business models are perceived differently according to stakeholders.** During our workshops and interviews we asked the participants to rank the business models by priority and we collected the following insights:
  - Public entities tend to favour business models 1 (open source/open data) and 5 (barter) whereas commercial entities tend to favour models 3 (Marketplace) and 4 (Software as a service). It means that the development of the business model of the future transport cloud should be designed in collaboration to ensure alignment of interests.
  - Model 2 (two-sided) is the least attractive for both populations.
  - Model 3 (software as a service) is the second more attractive for both populations.

*Insights on the legal structure for the Future Transport Cloud*

The business model choice is influenced by the legal entity which will support the Future Transport Cloud. For example, if it's a commercial entity, revenue-oriented business models will be preferred.

We observed more consistency in the ranking of legal structure by our experts: Association and Data Trust were favoured by the two populations (public and private organisations).

We present hereafter a level of fit between business models and legal structures types.

*Table 9: Level of fit between business models and legal structures*

| Structure | BM1 open data open source | BM2 Two sided | BM3 Market place | BM4 SaaS | BM5 Barter |
|---|---|---|---|---|---|


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|---|---|---|---|---|---|
| **Commercial entity** | Low | High | High | High | Medium |
| **Data trust** | Medium | Low | Medium | High | High |
| **Joint venture** | Low | Medium | High | High | Low |
| **Association** | High | Low | Low | Medium | High |

*Recommendations for the next steps of MobiDataLab project*

During Work Package 5 several activities with external stakeholders will take place (datathons, hackathons and codagons). They will be the opportunity to explore more precisely technical options, identify more precise use cases and in addition they could serve as a platform for the exploration of the business model for the FTC.

# 7. Appendix

## 7.1. Stakeholders interviewed

| Name | Responsibility | Organisation |
|---|---|---|
| Eli Nomes | | Transport & Mobility Leuven |
| Fabio Nussio | Head of International Affairs | Roma Servizi Mobilità |
| Hannah Tune | | Transport for Greater Manchester |
| Julia Käfer | Partner Management Consultant & Digital Mobility | NVBW |
| Valentin Muresan | Personal Advisor on digitalization & Smart city | Timisoara Muncipiului Primaria |
| Grégoire Dickson | Sales director | Kisio |
| Audrey Denis | Strategy Manager | Cubic Transportation System |
| Niels Wiersma | Data & Platform Strategy | Gemeente Eindhoven |
| Martin Lefrancq | Smart Mobility coordinator | Brussels Regional Public Services |

| | | |
|---|---|---|
| Johannes Eckert | Project Management Officer | Hochbahn |
| Pauline Aymonier | Head of Public Policy | Tier |

## 7.2. Consortium members workshop

**Agenda:**

- presentation of the findings from the literature review and the interviews
- collaborative workshop on the advantages, drawbacks, prerequisites of each business model
- collaborative workshop on the advantages and drawbacks of each legal structure
- individual prioritisation of business models and legal structures

**Tools and facilitation:** the workshop took place online using Miro as collective intelligence tool. After a quick introduction, participants were able to individually comment each model and legal structure according to a predefined template: advantages, drawbacks, feasibility, attractiveness and pre-requisite. The workshop concluded with an individual secret prioritisation of business models and structures.

**Participants:**

| Name | Organisation |
|---|---|
| Michela Apruzzese | ICOOR |
| Laura Babio | POLIS |
| Aliki Benmayor | KUL |
| Thierry Chevallier | AKKA |
| Didier De Ryck | KISIO |
| Selini Hadjidimitriou | ICOOR |
| Suzanne Hoadley | POLIS |
| Imran Hossain | HERE |
| Chris Wong | AKKA |

## 7.3. Stakeholders workshop

**Agenda:**

- presentation of the findings from the literature review and the interviews
- collaborative workshop on the advantages, drawbacks, prerequisites of each business model
- collaborative workshop on the advantages and drawbacks of each legal structure
- individual prioritisation of business models and legal structures

**Tools and facilitation:** the workshop took place online using Miro as collective intelligence tool. After a quick introduction, participants were able to individually comment each model and legal structure according to a predefined template: advantages, drawbacks, feasibility, attractiveness and pre-requisite. The workshop concluded with an individual secret prioritisation of business models and structures.

**Participants:**

| Name | Responsibility | Organisation |
|---|---|---|
| Audrey Denis | Strategy Manager | Cubic Transportation System |
| George Gorgogetas | Project Management & implementation | City of Trikala |
| Julia Käfer | Partner Management Consultant & Digital Mobility | NVBW |
| Valentin Muresan | Personal Advisor on digitalization & Smart city | Timisoara Muncipiului Primaria |
| Fabio Nussio | Head of International Affairs | Roma Servizi Mobilità |
| Elena Patatouka | Senior innovation expert and scientific project manager | City of Trikala |
| Gabriel Plassat | Transport expert | ADEME, La Fabrique des Mobilités |

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# MobiDataLab consortium

The consortium of MobiDataLab consists of 10 partners with multidisciplinary and complementary competencies. This includes leading universities, networks and industry sector specialists.

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