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Veeneman, Wijnand; Hirschhorn, Fabio; Klievink, Bram; Steenhuisen, Bauke; van der Voort, Haiko

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D11.4: Business model

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Deliverable Lead	Wijnand Veeneman, TUD
Further authors	Fabio Hirschhorn, Bram Klievink, Bauke Steenhuisen, Haiko van der Voort, TUD
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This deliverable is subject to final acceptance by the European Commission.

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Executive Summary

This document represents business model overview for PETRA. The business model is an integral part of the governance handbook, (D7.3), but is also listed as a separate deliverable. For all details, please refer to deliverable 7.3. Here an abbreviated version is presented.

The model uses a business model canvas to look at the main revenue and costs streams, risks and assumptions.

The business model is based on information that was gathered from the demonstrators and literature.

On the revenue side of the business model, the context and policies in place very much drive the expected revenues. Rather than providing an expected outcome, the model proposed existing and well developed approaches to estimate possible revenues, given a specific context.

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1 PETRA business case

PETRA main characteristics

PETRA is a system that adds value to mobility data platforms with travel planning on three specific characteristics. These characteristics are real-time (data, modelling and planning of trips), multi-model (trip plans), and nudging (of travellers towards public goals). The **real-time characteristic** will allow for the trip and travel planning to be closer aligned to the current state of the network. In addition, it will allow for real-time changes of advice. In addition, the data will be broader than traditional trip planners, focussing on network flow. Adding other data like weather, events, allows for predictive modelling using historical patterns and real-time data. The real-time characteristic could be further supported by the fact that the trip planner app supports the platform to have a real-time status of network flows, by anonymously contributing the location data of the various apps to the platform.
The **multi-modal characteristic** means that networks flows and planner options include a variety of modes. This allows network managers and traffic controllers to widen their analysis and solution set when considering options from network or flow interventions. In addition, it provides the trip planner to optimise the travellers trip using a wider variety of options. In addition, this variety of modes forms the basis of the third characteristic, as the app can present the traveller various modal options that are attractive from various perspectives, from healthy to quick, from cheap to comfortable, from clean to reliable.
The **nudging characteristic** allows for the metropolitan governments that have implemented the platform to better align the behaviour of the traveller with the conditions and goals of the urban space. Travellers are used to optimise their trips for travel time. This optimisation is often putting a strain on the network and the city, by its negative externalities. Travel can be polluting, congesting, unhealthy, etc. The platform allows the government to assess the network and provide the traveller with alternatives through the planner that are less polluting or shifting pollution to less vulnerable areas. They could nudge people in taking different routes, optimised for collective travel time optimisation, rather than individual travel time optimisation. They could show people the health effects of their choice for a different mode, for themselves and for those residing in or visiting the city. The platform with its real-time data and multi-modal modelling abilities would allow for estimating the effects and nudging users in more collectivised choices.

PETRA business model

A mobility data platform like PETRA has to be developed and maintained in an organizational context that is conducive to realising its potential. This context will consist of a variety of actors, for example data providers, platform managers, and planner users. Whether these actors have the propensity to contribute to the successful development and maintenance of the platform depends on the incentives that the platform's organizational context is providing them and how sensitive these actors are for the incentives provided.
A large part of these incentives will be monetary; whether they will they get paid drives their behaviour. For understanding the monetary basis of the platform it is important to understand the financial basis for the platform, both on the cost side as well as on the revenue side. This business case provides a first overview of the potential costs and revenues of a mobility data platform like PETRA.
Below an estimation of the costs and methods for analysing the benefits is provided.

<table>
<tr>
<td rowspan="2">Suppliers
• Data suppliers
• App developer
• Cloud service provider
• Model / algorithm suppliers
• Dashboard developer
• Payment service provider</td>
<td>Activities
• Data gathering
• Data storage
• Data enrichment
• App development
• Dashboard development</td>
<td rowspan="2">Value propositions
• Optimised urban mobility with reduced negative effects
• Optimised individual travel times, robustness and reduced negative impact of trip
• Easy availability of and access to mobility data</td>
<td>Relationships
• Patron
• App user
• Data user
• Cloud capacity user</td>
<td rowspan="2">Customers
• Metropolitan authorities
• Travellers / app users
• Raw data users
• Enriched data users
• Cloud users</td>
</tr>
<tr>
<td>Resources
• Data related to mobility
• App building capacity
• Dashboard building capacity
• Cloud capacity
• Payment service</td>
<td>Channels
• App for trip or travel planning
• Licences for data use
• Contract for cloud capacity use</td>
</tr>
</table>

<table>
<tr><td>Cost structure</td><td></td><td>Revenue streams</td><td></td></tr>
<tr>
<td>Computing level: direct costs of upholding the platform
- Cloud storage and computing capacity
- Communication capacity, T1 line
- Data licences
○ Mobile streaming data real-time
○ Mobile streaming data historic
○ GTFS/AVL/WIFI/BT/CCTV/PT-RFID in ownership
○ GTFS/AVL/WIFI/BT/CCTV/PT-RFID in licence
○ GTFS/AVL/WIFI/BT/CCTV/PT-RFID in open data
- Algorithm and model development
- App development
- App maintenance</td>
<td>

€12.000 pa
€10.000 pa

€400.000 pa
€40.000 pa
€0 pa

pm

€0 pa

€80.000 pu
€100.000 pu
€10.000 pa</td>
<td>Computing level: direct revenue of upholding the platform
- Cloud capacity
- Modelling capacity</td>
<td>

pm
pm</td>
</tr>
</table>

- Dashboard development
- Dashboard maintenance
- Sensor procurement and deployment
  o Camera
  o Bluetooth and Wi-Fi
	€120.000 pu
	€10.000 pa
	
	€1500 pu
	€2000 pu		

Platform level: operational costs of the platform
- Platform development and maintenance
  o Staff, 3 fte
  o Facilities
- Nudges as part of the platform[i]
	€180.000 pa
	€12.000 pa
		Platform level: transactional revenues of making the platform
		- Funding from government
		- Data licences from other data users
		
		- Nudges as part of the platform
			pm[ii]
			pm[iii]
			but advisable to relate price of data to the cost of acquiring the data
			pm

Total over 5 years	€3.670.000 estimated costs excluding sensors €3.800.000 estimated costs	**Total over 5 years**	**Highly dependent on local situation.**
Metropolitan level and societal: societal costs on the level of the metropolitan jurisdictions and beyond	none	Metropolitan level: societal revenue on the level of the metropolitan jurisdictions and beyond[iv] - Value of time saving and reliability for travellers - Willingness to pay for service providers	Value of time savings (Mackie, Diaz and Fowkes, 2001) Willingness to pay (Foelkner, 2006)

		- Societal gains in terms of health, reduced CO_2 emissions, etc.	Societal cost benefit analysis (Hanley and Spash, 1993)

Legend: pa (per annual), pm (no data available), pu (per unit)

Assumptions

The business model has several assumptions

- Costs on resources will be similar as experienced in the demonstrators and cases
- Both real-time and historic mobile phone streaming data are needed
- The platform will have its own sensor network
- Data licences are possible for the data needed and can possibly be transferred

Cash Flow Statement (NPV)

- The characteristics of the revenue stream do not allow for a detailed estimation of the revenue stream, without the context of a real metropolitan area and a real implementation of which the effects can be estimated. In the context of this broad analysis, these are not available. Here, instead, some high-level numbers are provided as well as references to methods to calculate the potential effects of the platform.

PETRA main risks

The effect of the platform has several key risks.

The first key risk is the **lack of users** of the app. The app is a key element in the changing the behaviour of the travellers in the region. If the app does not gain a substantial user base, the platform cannot realise its potential. Key factors might be the quality of travel planning by competing app providers, like Google, Moovit and Waze, or the visibility of the app compared to these competing providers. Another factor might be apprehension in the potential user base to share data, due to privacy concerns. Several mitigating factors are available. First, privacy should be secured in the platform, for which excellent algorithms are available that can be built into the platform. Second, metropolitan areas might already have an app with an existing user base. This helps kick-start the platform and extends the potential for nudging.

A second key risk is the **quality of data**. The platform's performance relies heavily on the quality of the data it takes in. In addition, the modelling approach is tuned to a specific set of data. With the landscape of mobility data rapidly changing, this could be under pressure. For example, privacy laws could now or in the future limit the possibility to use specific data types. Or providers of specific types of data might withdraw from the market, without comparable alternatives available.

A third risk is the **inability to nudge**. It might be that the platform is working fine, based on good quality data and that the user base is substantial. However, users are not willing to change their mobility behaviour. In this case the only societal benefit the platform could provide is the increased reliability of travel advice, beyond existing trip planners. That is a limited societal benefit.

Strategic Options

Beyond its key use, there is a number of potential strategic options for the platform. First, infrastructure managers in the metropolitan area can have a much more **accurate understanding of the current and upcoming network status**. This would allow them to manage road and rail network more effectively, even without influencing the travel behaviour through the app**.** Traffic control rooms of rail and road networks could be supported by the predictions of network status based on real-time data and prepare for specific situations later in the day or on specific types of days.

Second, infrastructure planners in the metropolitan area can also have a much more **detailed understanding of historic traffic flows and network speeds**, allowing them to optimise infrastructure network planning. Infrastructure planning, looking for weak spots and bottlenecks in the network could be simplified. Would infrastructure planners before the platform have to buy their own data sets and analyse these, the platform provides a ready to use set of mobility data that they can use in evaluation and analysis tools.

Third, **providers of transport services could use the platform to better plan and operate services**. Public transport and taxi operators could obtain a more detailed and accurate view on the current and historic network speeds and direct traffic or plan services in accordance to that more effectively and robustly.

Finally, the platform could provide local and global app developers **easy access to mobility data for the metropolitan area**, making it attractive for them to come up with new services to governments, businesses, and travellers in the area.

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Glossary

App	Application on a (usually) mobile device allowing for the planning of a trip or travel by app-users
App-user	Individual travellers that plan their trips or travel using an app
Platform	Computer facility consisting of hardware and software providing the storage or pass-through of (mobility related) data, data enrichment, data access management, and trip or travel planning services
Platform manager	Organizational entity that manages the development, maintenance, and control of the platform
Governance	The way platforms and all their features are governed by all stakeholders, both public and private.
Institutions	Rules that affect behaviour, including formalized, written rules and informal, more invisible rules.
Stakeholders	Actors that have an interest in mobility platforms. Most notably users, data providers, transport service providers, infrastructure managers and governments
Cloud	Virtualized computer hardware and software capacity available through connections to the internet
Trip modelling	Modelling single trips from one location to another to propose trip options optimized for specific parameters, mostly trip time minimization
Travel modelling	Modelling more complex travel over multiple trips to propose travel options, optimized for specific parameters, mostly aimed at landmark access
Trip planning	A supported evaluation, mostly through an app, of different options for a trip against a set of parameters by an app-user
Travel planning	A supported evaluation, mostly through an app, of different options

	for a travel plan against a set of parameters by an app-user
Real-time data	Data about a current situation
Mobility data	Data representing travel and transport or relevant to travel and transport
GTFS	General Transit Feed Specification, data format for schedule of planned or real-time public transport services
AVL	Automated Vehicle Location, technology that allows for tracking of the location of vehicles, often used in public transport, allowing for the generalized analysis of travel paths and speeds on a network
BT tracking	Bluetooth tracking, temporary (anonymized) storage of timestamps of the location of bluetooth enabled phones or computers through sensors, allowing for the generalized analysis of travel paths and speeds on a network
Wifi tracking	Wireless network tracking, temporary (anonymized) storage of timestamps of the location of Wi-Fi enabled phones or computers through sensors, allowing for the generalized analysis of travel paths and speeds on a network
Camera tracking	Video based tracking, temporary (anonymized) storage of timestamps of the location of recognized features (faces, number plates) through cameras, allowing for the generalized analysis of travel paths and speeds on a network
RFID tracking	Radio Frequency Identification tracking, temporary (anonymized) storage of timestamps of the location of RFID cards, allowing for the generalized analysis of travel paths and speeds on a network
GPS tracking	Global Positioning System tracking, temporary (anonymized) storage of travel paths from the GPS system of participating app-users, allowing for the generalized analysis of travel paths and speeds on a network

Nudges	Incentives provided to an app-user to optimize his trip or travel for other parameters than time minimization, that are more aligned with the collective needs of the city, for example policy goals like safer of more sustainable transport
Dashboard	The hardware and software available to the platform manager to influence the trip and travel planning along collectivized parameters

[i] Nudges are transactions that incentives app-users to make choices more in line with collective needs. Think about free public transport miles if an app-user makes trips more aligned with collective goals, like slower but cleaner. The transactions can pass through the platform manager, but generally are paid for by others.
[ii] The platform will need a steady revenue stream, expected to be provided by a government subsidy. Obviously, that subsidy should be in line with the expected gains on a metropolitan or societal level, with government having to decide which goals they want to realize and what effects they expect from the platform and what funding they have available for realizing those effects. Obviously, this means that all revenues in the right columns cannot be added. The revenues on a metropolitan and societal level should reflect the expected benefits, which the governmental actors can decide to invest in by funding the platform on platform level.
[iii] It is advisable to relate price of data to the cost of acquiring the data.
[iv] Here we do not provide estimated revenues or outcomes, as they are highly dependent on the metropolitan environment, existing travel patterns, and expected effects of the platform and app. The modelling ability of the platform should help in accessing the effects. Here we provide pointers to approaches on how to calculate the effects. Some generic numbers to support calculation:

- Value of time savings in travel is often seen as between €10 and €20 per person per hour (Warfemius et al, 2013, Meunier and Quinet, 2015),

Value of emission reduction is €30 per tonne CO_2 (Mandell, 2010) and an estimated €4500 per million car km (at 150 gr/km)