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The Urban Lab of Europe !

The TMaaS Project Journal N°1

*Project led by the **City of Ghent***

**URBAN
MOBILITY**

TMaaS
Traffic Management as a Service

The TMaaS project

In order to reduce the levels of congestion and support the modal shift in the city of Ghent, the **TMaaS** project seeks to harmonise mobility between different transport modes as well as inform the citizens of sustainable alternatives to move around the city. The project will create a traffic management system that will crowdsourcing information from citizen that will match with the true needs of the urban authority. It will organise traffic management as a service using a central cloud platform without investing in expensive hardware.

The traffic management system will gather data that goes beyond information on private vehicles on the roads. It will collect, process and centralise real-time information about public transport, social media messages, weather data, traffic light status, etc. The platform will be configured to the needs of the city and local mobility practices. Personalised information will also be provided to each citizen depending on their specific user needs recommending the most sustainable and time-efficient way to travel. Citizens will be able to interact with the platform by feeding back to the management control centre as they are best placed to shape the mobility culture in their communities.

Partnership:

City of Ghent; **1 software company:** WAYLAY NV; **3 private companies:** Tom Tom Development Germy GmbH; Be-MobileTech NV; De Staatse Ruiter; **2 higher education and research institutes:** Ghent University; KU Leuven; **1 association**: European Passenger's Federation

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1. Executive Summary

Ghent is the capital of the East Flanders province and the second largest municipality in Belgium. The city is very well connected to the surrounding areas and accessible from various other regions, attracting over a million students and visitors every year. While the city does not suffer from chronic road traffic congestion as other major European cities do, mobility management is nonetheless a priority high up in the agenda as commuter traffic is putting too much pressure in the mobility system.

The Traffic Management as a Service (TMaaS) project envisages building a platform that will offer cities the possibility of managing their urban (multimodal) mobility system with a less costly and more flexible tool than the traditional fully static urban traffic management systems. To that end, the project will deliver two key outputs: a mobility management tool for traffic managers, city decision makers and local authorities overall to visualise and better manage the local urban mobility system, and a citizens dashboard that aims at providing information to the population and notify its users of disruptions and accidents.

Despite being a shared venture between the City of Ghent and key stakeholders from the local ecosystem, the ultimate goal of TMaaS is to build an on-demand modular solution replicable to other cities, allowing users to build a customised tool by subscribing services according to their needs. For this purpose, the project includes an open call for European cities to join the project as a replicating city at a later stage.

For an introductory video of the project, please follow the link.

Partnership:

- City of Ghent (main urban authority);

- Ghent University (through three of its associated research units: i-Know, IDLab-TE and Mict);

- KU Leuven (through Mintlab, a research group part of the Institute for Media Studies, faculty of Social Sciences);

- Waylay (an SME based in Ghent, B2B software company);

- Be-Mobile (a global traffic information service provider);

- TomTom (a world-leading supplier of in-car location & navigation products & services);

- European Passengers Federation (an international NGO);

- De Staatse Ruiter (an independent communications consultant from Ghent).

But as with any innovation process, UIA projects are fraught with uncertainty, especially when considering the revolutionary nature of the innovations tested. Pre-empting risks and identifying associated opportunities is therefore a critical step towards the success of current and future UIA initiatives.

In the particular case of TMaaS, from the eight key challenges identified, the project performs well against several of these, although three are particularly critical to a successful

delivery: Monitoring and Evaluation, Financial Sustainability and Scalability.

The purpose of this journal - the first of a total of six – is to capture knowledge generated in TMaaS and share it across the community of city practitioners and policy-makers at regional, national and EU level. In each journal we will revisit the challenges, assess the progress made and uncover valuable knowledge that can be built upon by others.

2. Setting the scene

Transport plays a critical role in how cities work. It connects people and places. To a large extent, transport shapes our cities and has a profound effect on how people relate to them and experience the urban realm. But as much as transport enables opportunities, it also poses one of the greatest challenges city authorities face when exploring options for a sustainable urban development.

Congestion, road casualties and unsafe levels of air pollution are just a few of the too well-known negative externalities cities have been facing for quite a while[1]. At the same time, evidence shows demand is greatly induced by the increased capacity that results from building more infrastructure in response to the growing demand[2]. To that end, measures in the domain of mobility management that rely on a better use of data to manage the existing resources can play a significant role in enhancing traffic management in urban areas[1]. They can help improve the flow and efficiency of movements, while enabling the promotion of more sustainable modes of transport.

For these reasons, data collection is an increasingly critical factor for urban mobility management. But whilst mobility-related data collection has traditionally relied on the creation of static sensor networks (which require systems as loop detectors, roadside sensors and video cameras), technology has drastically evolved, and less physically intrusive data sources such as floating car data, crowd-sourced data and other third-party sources have become an increasingly viable alternative in a near-future reality.

2.1 Europe

It is estimated that by 2050, 30% of the population will be over 65 years old and 60% of people will be living in urban areas[3]. This will present an enormous challenge to city authorities as the needs of personal mobility are likely to follow this trend. It is expected that passenger transport alone will grow by about 42% from 2010 to 2050[4].

But despite the fact that European cities have been facing growing problems caused by transport and traffic, traditionally, road network and traffic management were focused on optimising the mobility of private cars. It was only over recent years this focus has begun to change, as the needs for alternative modes such as public transport, cycling and walking have become increasingly significant, and mobility policies have been more and more designed to give greater relevance to these modes.

At the same time, transport is a major driver of economic growth. The transport industry

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[1] European Commission (2017); *Sustainable Urban Mobility: European Policy, Practice and Solutions*; https://ec.europa.eu/transport/sites/transport/files/2017-sustainable-urban-mobility-european-policy-practice-and-solutions.pdf [last accessed 25th October 2018].

[2] Peter Hills (1996); *What is induced traffic?*; (Transportation, Vol. 23, No. 1, pp. 5-16).

[3] European Commission (2017); *Network and Traffic Management Systems - Expert group report*.

[4] European Commission (2017); *Europe on the move: shaping the future of mobility, making vision a reality*; https://ec.europa.eu/transport/sites/transport/files/mobility-package-factsheet-overall.pdf [last accessed 16th October 2018].

directly employs more than 11 million people, accounting for 5% of total EU employment[4], and for around 5% of gross domestic product (GDP)[5]. In this sense, reducing congestion, accidents and pollution, while at the same time not harming Europe's competitiveness is a very big challenge shared by all Member States, one where urban authorities play a particularly important role.

Recognising both the challenges ahead and the deep transformation the transport sector is experiencing, the European Commission (EC) continuously develops policies and legislative initiatives as part of its ongoing effort to support Member States in the transition towards a more sustainable mobility system.

Intelligent Transport Systems (ITS) services and products have proven their value in improving safety and efficiency and reducing negative environmental impacts of the transport sector long ago. They offer a variety of means to manage the road and public transport network in a coordinated manner. In this context, in 2008 the European Commission put forward the ITS Action Plan, paving the way for the Directive 2010/40/EU, which sets out the framework for the deployment of ITS in the field of road transport and for interfaces with other modes of transport. More specifically, the Directive

identifies four priority areas for ITS development and deployment, among which the "optimal use of road, traffic and travel data", that aims at accelerating the deployment of innovative technologies such as urban traffic management systems. This advocacy for urban ITS initiatives was aligned with the previously adopted Action Plan on Urban Mobility which, in 2009, proposed to offer assistance on ITS applications for urban mobility.

Likewise, the role of digitisation has been recognised in the Strategy for low-emission mobility, where the EC highlights the potential benefits of digital mobility solutions in increasing the efficiency of the transport system, including better distribution of traffic across the infrastructure.

Lastly, the recently announced "Europe on the Move" agenda for a socially fair transition towards clean, competitive and connected mobility for all, reiterates the need for the EU to harness the opportunities of digitisation and automation in enhancing the efficiency of transport networks. In particular, the EC encourages stakeholders to take advantage of the opportunities created by digital technologies and new business models that enable real-time analytics and data on traffic conditions.

2.2   Belgium and Flanders

In recent years, Belgium has been suffering from heavy traffic congestion with an estimated economic impact ranging from a few hundred million euros to several billion, along with all the other unintended consequences to the environment, health and road safety[6].

But despite all its challenges, the role of transport as an engine of the Belgium economy is undeniable. Just in 2016 alone, the transport and storage industry added gross value of €16.014 million (4,2% of total GVA)[7].

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[5] European Commission: *Transport sector economic analysis*; https://ec.europa.eu/jrc/en/research-topic/transport-sector-economic-analysis [last accessed 16th October 2018].
[6] Belgian Ministry for Mobility (2017); *Directive 2010/40/EU ITS Progress Report 2017: Belgium*.
[7] Data computed by the author from Eurostat (2018); *Regional economic accounts 2016 & Transportation and storage statistics 2016*.

> **In 2016, 14,8% of the household expenditure in Belgium was spent on transport. In Flanders, the average was 11,4% (corresponding to an average expenditure of more than €4.000 per person per year)[7a]**

Considering this landscape, Belgian authorities have set the digitisation of transport and logistics a priority in order to increase efficiency, reduce costs and promote better use of resources[6].

> **In 2017, mobility and public works represented 6,5% of total Flemish government expenditure (of which, more than a third was spent on public transport)[7a]**

However, in Belgium, several competences in the domain of road transport, road infrastructure and public transport by bus, tram and metro fall under the regional jurisdiction, whereas railways fall within the competences of the federal government[8]. Responsibilities in the field of ITS are therefore shared between the Regions and the Federal State[6].

According to the latest Belgium ITS progress report[6], the government of Flanders is fully committed to making ITS the backbone of the mobility of the future. To that end, a public tender has been launched in the Summer of 2017 to prepare a long-term vision on ITS and to develop a strategic action plan by mid 2018. Traffic guidance and real-time information on multimodal travel are two of the pillars of this strategy.

Furthermore, the Flemish region has been implementing its open data vision by making available a growing number of datasets on its own open data portal, an instrument that addresses the requirements established by the EU Directive 2010/40 concerning the creation of National Access Points[6].

[7a] Data computed by the author from Statbel (2017): *Huishoudbudgetonderzoek (HBS) 2016*.
[8] Belgian Ministry for Mobility and Transport (2012); *ITS report 2012: Reporting on national and regional ITS actions envisaged over the following five year period, Belgium*.
[8a] Data computed by the author from *De Vlaamse begroting in cijfers*; https://www.vlaanderen.be/nl/vlaamse-overheid/werking-van-de-vlaamse-overheid/de-vlaamse-begroting-cijfers-2017#82605 [last accessed 11th October 2018].

3. A snapshot of Ghent

Ghent is the capital of the East Flanders province and the second largest municipality in Belgium. With currently 261.067 inhabitants[9], the city's population has grown steadily since 1998, a trend that is expected to continue in the foreseeable future[10].

As a university town and cultural hub, Ghent attracts thousands of students and over a million visitors every year. The city is very well connected to the surrounding areas and accessible from various other regions, both by road and rail (for instance, Gent-Sint-Pieters, one of the largest train stations in Ghent, is the busiest station in Flanders). Water transportation is also an important feature of the city, as a vast port area is located in its outskirts.

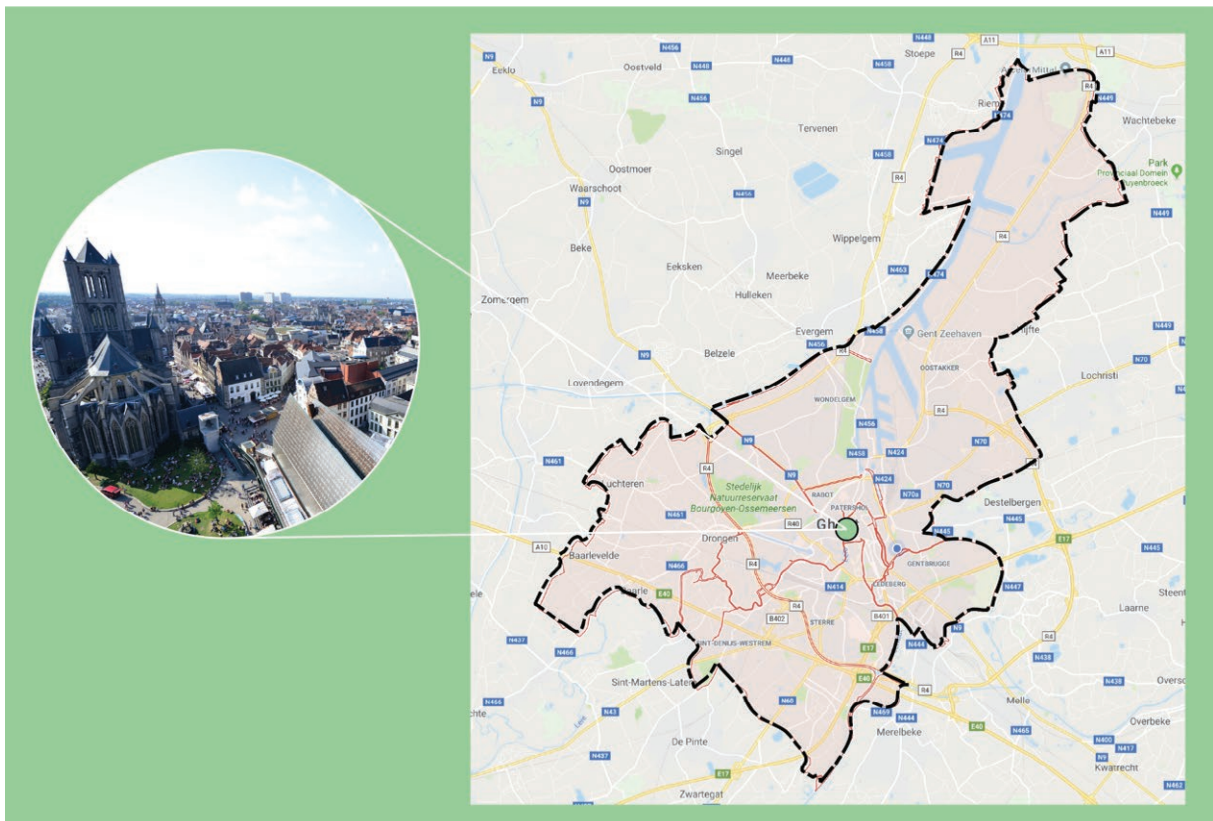**Figure 1:** *Demographics of the population in Ghent*

Figure 2: *Map of Ghent*

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[9] Bevolking 2018; https://gent.buurtmonitor.be/ [last accessed 11th October 2018].
[10] Stad Gent (2015): *Mobiliteitsplan Gent: Strategische mobiliteitsvisie, mobiliteit als motor voor een duurzame en bereikbare stad*.

In that respect, according to a mobility study conducted in 2012[10], Ghent residents make more than 650,000 trips per day, and back then 54% of all journeys were made by car, in contrast with 62% in 2000. In 2015, this figure dropped even more, to 45%, while the number of residents has continuously increased. Nowadays, almost a third of all residents' journeys are made by bike.

But despite these encouraging signs in the reduction of car dependence and increase in the use of more sustainable modes, commuter traffic is still putting too much pressure on the mobility system, in particular during peak times.

In fact, according to Ghent's Mobility Plan[10], over 50% of the jobs available in the city are filled by a non-Ghentians, registering that nearly 96.500 people commute to Ghent on a daily basis for work reasons, while around 39.500 people work outside Ghent. It is estimated drivers in Ghent spend an average

Figure 3: *Modal split for residents of the City of Ghent, in 2015 (% of trips)[10a]*

of 6% of their driving time in congestion, and that each car commuter spends about 15 hours in congestion during peak hours every year[11]. Whilst these are not entirely bulging numbers for an urban area, the fact is that in 2016, 18% of additional travel time was required, on average, compared to a free flow situation[12].

In 2017, Ghent was the 4th (out of 10) most congested city in Belgium.[11]

Mobility management is consequently a priority high on the agenda that dates back to 1997, when the first parking guidance system was installed in the city. This system was then set to be replaced following a decision in 2008 to make the investment in a more flexible traffic management system, that would not only inform drivers on the number of parking spots available, but also provide them with the most optimal route and other helpful information such as events and road works[10].

In 2013, the parking guidance system's scope was finally expanded to traffic management with the creation of a regional traffic centre, fully complementary to that of the Flemish Traffic Centre, as its focus is on the local road network and the major access roads (including 2 highways) to the city. However, it was soon recognised by the city administration that the city had neither the funds nor the ambition to set up a permanent control room in which traffic is
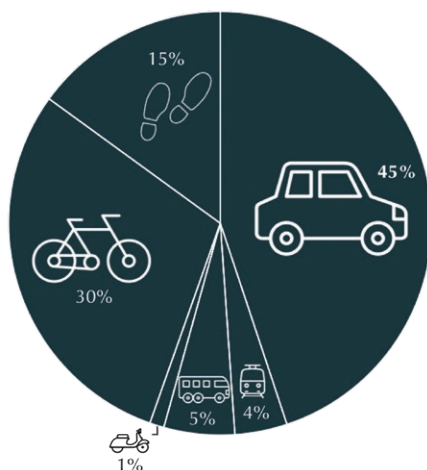
10a Gent: zoveel stad: *Mobiliteit > Modal Split*; https://gent.buurtmonitor.be/ [last accessed 12th October 2018].

11 INRIX: *INRIX Global Traffic Scorecard*; http://inrix.com/scorecard-city/?city=Ghent&index=653 [last accessed 11th October 2018].

12 TomTom: *TomTom Traffic Index – Measuring Congestion Worldwide*; https://www.tomtom.com/en_gb/trafficindex/city/ghent [last accessed 11th October 2018].

monitored by operators day and night. Instead, the city would rather work on a solution that would collect information through collaboration and control traffic by sharing information10, with the hopes of influencing mobility behaviour by communicating (real-time) information to users. The concept of TMaaS was then born, and in April 2018 the mobility dashboard was launched, which has been supporting the Traffic Management Centre team ever since.
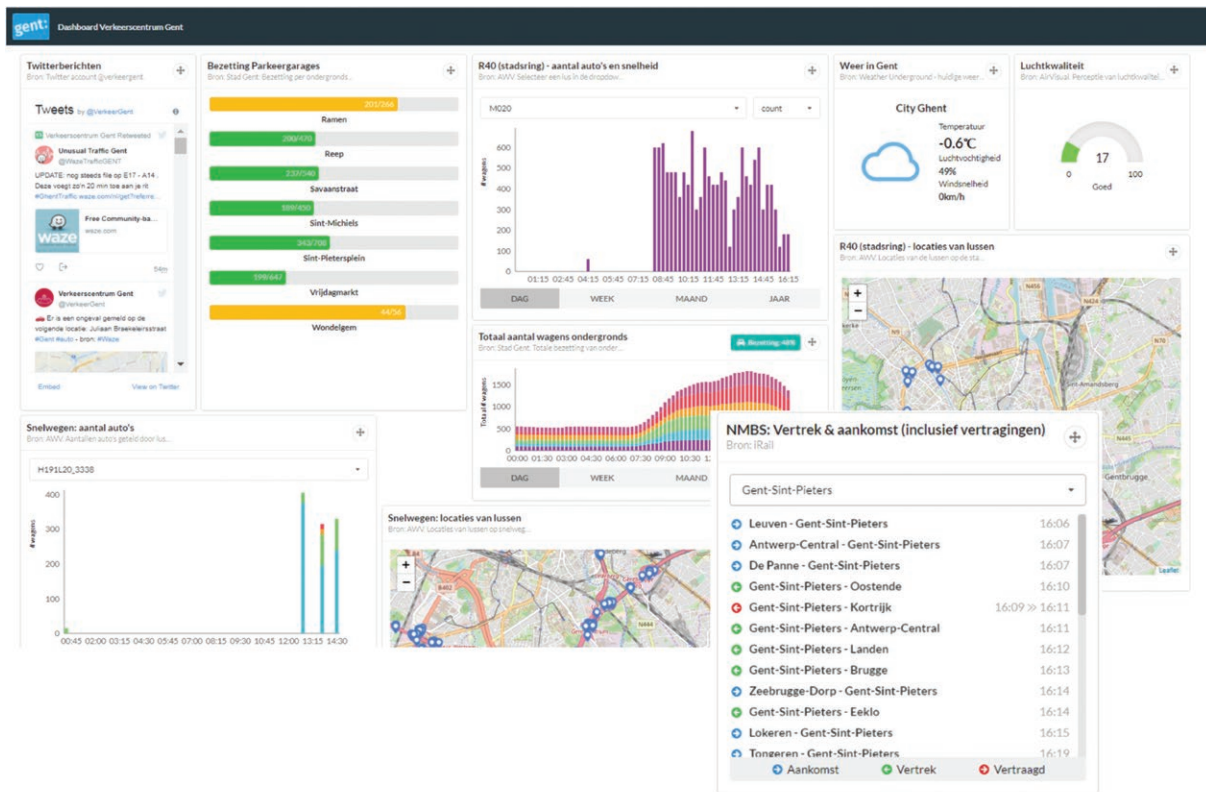

Figure 4: *Mobility dashboard*

4. TMaaS in a nutshell

4.1 Project Overview

The Traffic Management as a Service - TMaaS - project will build **a platform that will offer cities the possibility of managing their urban (multimodal) mobility system** with a less costly and more flexible tool than the traditional fully static urban traffic management systems.

TMaaS will have **three main functionalities: data aggregation, data analysis and communication of information**. To that end, the project will deliver **two key outputs: a mobility management tool** for traffic managers, city decision makers and local authorities overall to visualise and better manage transport infrastructure and mobility solutions available in their cities, **and a citizens dashboard** that aims at providing information to the population and notify users of disruptions and accidents.

Through the mobility management tool, users will be able to visualise consolidated information coming from multiple data sources such as floating car data, bicycle counters, public transport information, weather information and air quality data in a single dashboard. In order to ensure interoperability, the platform should be able to connect to existing systems which typically cities are already deploying, such as variable message signs and traffic lights.

Users will, in real-time, be able to check the status of all transport modes on a dashboard, as well as compare it with historical data. But besides its visualisation element, TMaaS will also interpret the mobility data that is fed into it and alert its users when triggered by the thresholds set in advance.

Moreover, TMaaS will not only allow urban authorities to understand what is happening in their cities in real-time, but also enable cities to communicate with the population in a two-way fashion: the tool will disseminate personalised information on road traffic conditions, accidents, weather updates, and status of urban mobility services such as availability of car-sharing vehicles, bicycle parking, as well as receive feedback from end-users.

Citizens and regular visitors will have access to a dashboard where they can select their preferences and subscribe to alerts. In case of a particular mobility event or disruption that matches the preferences or routes of a specific user, they will be notified and provided with alternatives. Communication between TMaaS operators and citizens will be powered by integrating existing social media messaging tools and chat bots.

The ultimate goal is to build an on-demand modular solution, where users can build a customised tool by subscribing services according to their needs (data sources, spatial reach, etc.). Depending on the city, TMaaS can become a standalone solution to manage urban mobility, or a complementary one to more traditional open systems. Another important feature of TMaaS is that it will be a cloud-based, interoperable system, avoiding the dangers of vendor lock-in.

4.2 Approach

TMaaS has adopted the Quadruple Helix model where government, universities, industry and citizens cooperate towards the same goal.

At the heart of the project is its user-centred design approach with user engagement being strongly embedded throughout the project. In fact, one of the most innovative features of TMaaS is the (still fairly unconventional) active involvement of users which starts at an early stage for the purpose of gathering insights, and subsequently to co-design the outputs, making sure that the developed solutions are fully aligned with their needs and expectations. Through this approach, the partnership aims to realise the project's vision:

- **See** what's happening in the city 24/7;

- **Show and tell** citizens what's going right and wrong on the streets;

- **Listen** to their responses and **act** upon them.

In terms of implementation, it is possible to look at the project as a combination of activities contributing to three key building blocks:

1. **Build the foundations**

   Set of activities that include conducting all background research, mapping user needs (including traffic managers and city) and requirements in order to define the system architecture.

2. **System development**

   Phase that entails building the platform and its user interfaces (dashboard for city managers and citizens), the process of integrating data sources and development of the business model that will ensure sustainability of the outputs beyond the project lifetime as well as to facilitate replication.

3. **Local trial and replication**

   Last step of the project that envisages rolling-out the outputs to other cities from mid-2020 onwards and fine-tune the outputs through the evaluation of user-experience.

4.3 The Local Ecosystem

TMaaS is a shared venture between the City of Ghent and key stakeholders from the local ecosystem of organisations that do innovative work in the urban mobility arena, echoing the Quadruple Helix model of open innovation.

In particular, the partnership comprises 8 organisations that represent key components of the urban mobility value chain: a local authority (City of Ghent), two universities (Ghent University and KU Leuven), two global intelligent mobility service providers (Be-Mobile and TomTom), a software development company (Waylay), a non-governmental association representing the interests of the civil society (EPF), and a communications expert (De Staatse Ruiter). It is a partnership extremely complementary, with capabilities ranging from user research, data analytics, intelligent transport systems, relationship management and communication.

Besides the delivery partners, TMaaS has established an external Advisory Group that provide overall strategic questions related to the implementation of the project and input to specific challenges the team might be tackling on the basis of their subject matter expertise. The group consists of twelve members with recognized expertise in traffic or mobility management, business models and public-private partnerships, coming from different areas such as academy, public service and industry.

From a wider ecosystem perspective, TMaaS has adopted an approach that reaches out to Ghentians and city visitors, actively engaging the end-users in the innovation process.

5. Key challenges

Innovation is a process full of uncertainties. It is the brave journey of exploring novel solutions to tackle problems or opportunities without being sure of the destination. But the success and efficiency of an innovation process is strongly dictated by the way these uncertainties are managed.

Considering the UIA Programme aims at creating revolutionary innovations through the experimentation of completely new solutions, never tested before in the European Union, it is particularly important to pay attention to the challenges, pre-empting risks and identifying associated opportunities. It is a critical step towards

the success of current and future UIA initiatives.

From past experience, there were seven overarching implementation challenges identified, common to all UIA projects. In the case of TMaaS an eighth challenge has been added which is specific to the scope of the project. These challenges will be revisited in all future journals to assess progress made and uncover knowledge that can be built upon by other city authorities.

From the very beginning, it was recognised that three of the eight key challenges pose particular risks to the successful delivery of TMaaS. These are expanded in the following sections.

5.1 Monitoring and Evaluation

TMaaS will have two main outputs: a mobility management tool for cities to visualise and better manage their urban mobility system, and a citizens dashboard with a notifications add-on that aims at providing information to the population and alert users in case of disruptions and accidents.

Delving into each output individually, in the case of the mobility management tool the local changes expected will predominantly be at the operational level (e.g. number of mobility indicators analysed, network/area covered by the traffic management centre, reliability of data sources, cost), but can also be of strategic nature, considering the potential impact it could have as a result of making mobility information available through the public API to the external community of innovators.

Similarly, even if not significant at an early stage, the citizens dashboard should have a

direct impact in the way people move in the city, given the changes in behaviour that could be induced by providing more accurate and reliable information to users, and by offering alternative routes or travel modes through the notifications.

From the outset, the team has put in place effective processes and procedures to measure project progress which allows the continual monitoring of project activities and, if needed, trigger correcting measures to adjust the initial course of action.

Additionally, the project also envisages an evaluation phase to assess usability and overall user experience (UX) of the citizens interface. But while this is an essential step towards improving the usefulness of the outputs, it does not fill the need to assess the effectiveness of this communication tool and the potential changes in the local context as a consequence of it.

There is, however, one aspect (common to all UIA projects) that cannot be overlooked: the duration of TMaaS imposes serious limitations to an accurate assessment of the changes in the local context. Nonetheless, the project has all the necessary mechanisms already in place to implement a monitoring framework on top of it with relative ease, from which the magnitude of the potential local impact could be inferred. In particular, TMaaS could leverage the citizen engagement activities such as the UX evaluation and the feedback loop that will be created to capture end-user response to the notifications.

All things considered, the main risk TMaaS faces is missing the opportunity of being able to demonstrate the added value of the outputs and build a robust case for future investment. To this end, establishing a sound baseline of the local situation and the specific changes the project intends to achieve in this context would be a crucial first step in setting up a monitoring and evaluation framework.

5.2 Financial Sustainability

The long-term success of TMaaS relies in the partnership's ability to ensure the outputs' existence post project life and UIA funding through a balanced cost structure and income streams. The financial sustainability of TMaaS outputs is therefore underpinned by the success of a sustainable business model.

TMaaS is rather well placed to address this challenge. The partnership has a very complementary skillset and is fairly well balanced with representatives from the entire value chain, including industry partners that will co-develop the solution with its future users - there is a legitimate interest in making the outputs competitive and replicable.

Nonetheless, there is currently some uncertainty associated to the competitiveness of the outputs purely from a cost perspective as it is yet unknown the potential magnitude of future setup and operating costs of TMaaS mobility management tool, and how competitive it could be against a more conventional traffic management solution. Despite the fact that, as a result of the UIA funding, most research and development costs will not weigh on the future cost structure, the currently favourable scenario is also hiding costs such as the ones of the data sets that commercial partners will provide free of charge until the end of the project (2021). Hence, it is critical to ensure the solution is not at any risk of becoming vendor locked-in.

There is a very close relationship between this challenge and that of monitoring and evaluation.

5.3 Upscaling

UIA projects are pilot experimental actions and as such have limited results. But when an initiative delivers successful outputs with promising results it can outlive the project and grow by either be expanded to a larger urban area, or replicated in other cities or regions, and thus generating greater positive impacts.

As far as TMaaS is concerned, the project includes a set of activities dedicated to replicating the mobility management tool in other (non-)European cities. This is a particularly noteworthy approach as it aims to work on the capitalisation of the outputs within the project lifetime, ensuring the solutions will not be tailored exclusively to Ghent, but also consider the needs of a larger market. The project comprises activities such as an audit to traffic management centres in order to collect requirements of other cities, and the challenge entails reaching out to a sufficiently diverse and representative group to guarantee cross-site differences will be sufficiently embedded in the development of the solutions.

But as cities are rarely a blank canvas and several cities have already some kind of mobility management structures, it is also extremely important to ensure TMaaS will be interoperable with other systems, in a complementarity perspective. To this end, a particularly relevant aspect is the compliance with all standards currently in use by the ITS community.

As for local scalability, TMaaS targets the city of Ghent. Nonetheless, a significant share of daily movements consists of inflows from areas outside the city boundaries, leaving room for a future expansion of the system. However, the success of the partnership in tackling the previous two challenges described, and the one of communication will be instrumental to this scalability (and transferability) potential.

Table 1: Key challenges tracker for TMaaS (as of Sep. 18)

Challenge	Status	Notes
Leadership for implementation	Low	Overall, TMaaS has been able to tackle this challenge quite successfully. Ghent University has taken upon the leading role of day-to-day matters, keeping a good pace of project delivery and ensuring quality standards are met. The partnership has monthly face-to-face meetings, which also helps to keep momentum. The main aspect the delivery team has to realise is how to overcome some sense of containment by the city administration, mostly due to the inherent uncertainties of an innovative project. It is therefore expected a louder political support once the backwash of the local elections settles and the project reaches a more mature stage. Nonetheless, from a purely project delivery perspective, this is outweighed by the active participation of the Traffic Management Centre personnel, which speaks to the importance of the project at local level.
Public procurement	Low	As the main innovations in TMaaS will be delivered by its partners, most items to be procured are rather standardised products and services (design and copywriting services, production and printing, etc.). Other than a few items such as the data sets, which fall out of the typically pre-specified family of products, public partners will not need to resort to outcomes-based procurement processes. Therefore, the main constraint in this challenge relates to how time-consuming public procurement processes can be, and the potential delays as a result of a longer period of requirements definition than expected.
Integrated cross-departmental work	Medium	Cross-departmental work is particularly challenging in public organisations as structures tend to be fairly siloed and processes overly bureaucratic, but this scenario is oftentimes experienced in big companies too. In an effort to tackle this challenge in TMaaS, one of the city council's representatives acts as liaison with other municipal structures, facilitating the relationship with the multiple city council's departments. By working towards reinforcing buy-in from other departments within the city council, TMaaS aims at fostering a stronger collective sense of ownership and expanding the pool of advocates for the project. Another benefit of building such bridges is that it would enable TMaaS to better leverage on the already existing resources such as the municipal communications department.

Challenge	Status	Notes
Participative approach	Low	TMaaS is particularly strong in this domain. Several measures have been put in place to maximise collaboration, both internally to the partnership and externally, reaching out to wider groups of stakeholders. Overall, there is a very good level of collaboration and commitment by all TMaaS partners. Mild tensions do exist, which are expected in consortia that bring together commercial organisations sharing the same market space. Nonetheless, TMaaS has been quite successful in building a sense of team across the different partners. In particular, the project adopted a few managerial tools that are typically used in corporate environments such as regular team building activities and anonymous peer reviews. Another element that has been reported as an enabler to this easiness in the relationships is the geographic proximity of most partners. From an outreach perspective, the project envisages active involvement of citizens in multiple moments. The aim of the user-centred approach is twofold: on an initial phase to uncover insights about Ghentians and their attitudes and behaviours regarding their daily traveling choices, and on a subsequent phase to foster the co-development of the solutions that will ultimately serve the population. From this standpoint, the key challenge comes down to managing the expectations of users towards the outputs in an effective manner, ensuring good alignment between user preferences and what the project can deliver with the resources available and within its lifetime. TMaaS has also set up an Advisory Board which provide overall strategic advice to the project and contributes with additional expertise to specific challenges the team might be facing.
M&E	High	Measuring the impact of TMaaS presents a number of challenges, but the project has all the necessary mechanisms in place to implement a monitoring framework. It will be critical for TMaaS to be able to demonstrate the added value of the investment made, and the magnitude of its results in the local context, especially considering the ambitions of future exploitation of the outputs. Establishing a baseline would be a crucial first step in setting up a monitoring and evaluation framework. This challenge is described in greater detail in the running text.
Financial sustainability	High	There is a very close relationship between this challenge and that of monitoring and evaluation. The financial sustainability of the outputs is underpinned by the success of the business model, but TMaaS is rather well placed to address this challenge with a complementary team that represents the entire value chain. In particular, commercial partners have all the interest in making the outputs competitive and replicable. This challenge is described in greater detail in the running text.

Challenge	Status	Notes
Communication	Medium	Communication is a cross-cutting challenge that touches on several other implementation challenges, though it gains particular significance with the challenges 'participative approach' and 'upscaling'. The project's overall success will be strongly dictated by a consistently clear message, tailored to the very diversified primary target audience. Significant efforts have already been made by TMaaS in an attempt to send out simple and easy to understand messages, such as the introductory videos. Target audiences have been identified early on and so have the high-level communication objectives. Moreover, user engagement is strongly embedded in TMaaS. Both practitioners and civil society are directly represented in the partnership, which makes them natural ambassadors for the project. Furthermore, considering the scale of the user engagement component supporting the research activities, there is also an opportunity to free ride on co-design activities to establish good communication channels to raise awareness and disseminate the project. From this standpoint, it is in fact critical to look at the approach in a shared manner, in order to closely align the user research and co-design activities with the communication strategy. Likewise, the success of specific activities such as the open call for replicating cities and exploitation of the outputs beyond the project duration is highly dependent on the clarity of the message, in particular around the ambitions of TMaaS and its key differentiating factors.
Upscalling	High	There are two key factors to consider in this challenge: the risk of vendor lock-in and interoperability. TMaaS has a dedicated set of activities to look into the transferability of the traffic management tool in other European cities, which is a very good start to work on the future capitalisation of the outputs ahead of the project closure. In addition, the magnitude of this challenge is greatly determined by three other challenges: communication, monitoring and evaluation, and financial sustainability. This challenge is described in greater detail in the running text.

6. Progress to date

During the first six months of the project, partners have invested their time and resources mainly in four streams of activities:

Initiation and fine-tune governance

The initial period of TMaaS involved partners building a framework for collaboration, which included agreeing on IPR, mobilising teams and fine-tuning all project responsibilities, management processes and procedures.

As one of the initial partners ended up not being part of the final TMaaS consortium, the remaining organisations had to reassign tasks in order to maintain the project scope unchanged.

It was also during this early phase of the project that the Advisory Group was established and the first meeting held.

Research

Considering research is a significant component of TMaaS, this was one of the main activities conducted in its multiple strands: desktop research to establish the state-of-the-art on traffic information tools and travel decision making, ethnographic research to uncover user needs and preferences, and landscape analysis on already existing traffic management centres, including their business models and mapping of needs.

Platform requirements

Partners also worked on one of the first steps towards building the platform by identifying the information that would be useful to the different
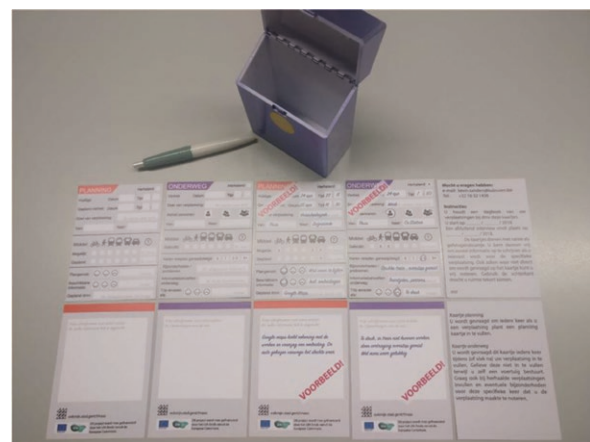

Figure 5: *Resources used for the user research activities (diary study cards)*

users and mapping the data required to respond to those needs.

Stakeholder engagement and foundations for communication

Initial activities in this area encompassed mapping stakeholders, establishing the communication strategy and first communication materials (website, introductory videos and flyer), as well as setting up the framework to monitor wider groups of stakeholders. In particular, the latter included the recruitment of six citizens representing different groups of potential end-users that will act as a sounding board throughout the project – they will help identify strengths, weaknesses, opportunities and threats for TMaaS.

Alongside all outreach activities, TMaaS also conducted its first teambuilding activity, a kayaking activity, and its first peer review.

As a result of all initial efforts, the City of Ghent has received the CIVITAS Bold Measure Award, which recognises the innovativeness of the TMaaS project and the forward-looking approach in the field of urban mobility.

Figure 6: *Team building activity (kayaking in the Lys)*

Figure 7: *Sophie Gillaerts and Peter Meirsschaut (City of Ghent) at the CIVITAS Awards 2018 ceremony*

7. Experiences to build upon so far

Along the implementation of the project there will be two distinct learning areas: one related to the managerial/administrative setup of the project, and another one related to project activities and the partnership's approach to the specific urban challenge.

The purpose of this section is to capture the ones that will have potential value to other urban authorities looking at implementing projects of similar nature. Despite TMaaS young age, a few experiences have already emerged in the way the partnership is managing the project:

7.1 Intellectual Property Management

Intellectual Property Rights (IPR) play a particularly important role in consortia that include businesses that bring commercially sensitive background information to the project, or where outputs or results generated by the project have promising exploitation potential beyond the project's lifetime.

As commonly seen in European-funded projects, either for time constraints or due to uncertainties in the project scope, in the case of TMaaS, IPR were only addressed during the preparation of the Partnership Agreement. This led to partners spending a significant amount of time of the first six months of the project discussing terms

and conditions of the IP agreement. The fact that partners invested so much time to reach an agreement is a positive sign of how invested they are in the project, but this process did result in a relatively long initiation phase of the project (and delay in the disbursement of the grant), taking also its toll on the initial working pace.

Momentum was eventually regained once IPR terms and conditions were finally agreed upon, and the project is now in full delivery mode, but the situation could have been avoided had preliminary discussions occurred ahead of the submission of the proposal.

7.2 Building a Sense of Team

One of the innovative approaches TMaaS has implemented relates to the way the delivery team is being managed as a whole. In particular, TMaaS has adopted managerial tools that are typically used in corporate environments such as team building activities and anonymous peer reviews. For this latter purpose, at least one person of each partner organisation takes part of the peer review process, conducted every six months. Additionally, the project has set up

a co-working space in order to make it possible for all the project members to work at the same location and meet in between meetings.

This approach has been proving to be quite successful in strengthening the bond between individuals from different delivery partner organisations, as well as uncovering insights that help to pre-empt any issues within the partnership and identifying opportunities for improving ways of working.

8. What to expect next

TMaaS is expected to register significant progress during the next six months, namely:

- November 2018: second round of user engagement targeted at Ghentians and visitors of the city, focused on the **co-creation** of the digital information tool

- January – April 2019: Launch of the **open call** and registration period for expressions of interest from other cities around the world

- April 2019: Publication of a report detailing the **requirements of the City's traffic operators and end-users**

Urban Innovative Actions (UIA) is an Initiative of the European Union that provides urban areas throughout Europe with resources to test new and unproven solutions to address urban challenges. Based on article 8 of ERDF, the Initiative has a total ERDF budget of EUR 372 million for 2014-2020.

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