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**TM2.0 as an enabler of MaaS and its employment in MyCorridor**

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**Abstract**

This paper addresses the convergence of two major trends in the transportation world, namely MaaS (“Mobility as a Service”) and TM2.0 (“cooperation between traffic managers and service providers”); the specific case study described is MyCorridor project.

The paper claims that TM2.0 is an effective enabler of MaaS and vice versa, we demonstrate that MaaS world could become an enabler for TM2.0. This will be evaluated in MyCorridor EC-funded project. MyCorridor is approaching the MaaS concept by addressing those services that are connected to the vehicle world, with the primary aim to stimulate travellers to shift from private vehicle ownership to sharing economy concept (car sharing, bicycle sharing, public transport and para transit). It extends the TM2.0 concept by providing a solution that incorporates multi-modal, seamless, flexible, reliable, user-friendly, all inclusive, price-worthy and environmentally sustainable travel at cities, regions and cross-border.

**Keywords:**

**TM 2.0, MAAS, CONNECTED TRAVELLER**

**Introduction**

The Mobility as a Service (MaaS) concept can be defined as the ability of transport products/services to allow travellers for continuous travelling within a geographic region independently of the transport mode offering integrated payment options. Therefore, MaaS can be considered a tool for building sustainable communities across three pillars: environment, quality of life and social welfare.

However, in many cases MaaS schemes omit smooth transition from private vehicle ownership towards car sharing/usage. Moreover, the MaaS schemes emphasize on services for travellers; but what about the optimization of mobility operations through traffic and multi modal transport management?

The concept of Traffic Management 2.0 (TM2.0), builds upon the deployment of connected vehicles

TM2.0 as an enabler of MaaS and its employment in MyCorridor

and travellers in order to achieve convergence of mobility services and traffic management, combining actions of the individual travellers with the collective mobility objectives.

The traffic management industry offers well-proven ITS (Intelligent Transport System) solutions for improving traffic flow and safety using a large diversity of sensors along the roads. Traditional traffic data collection, monitoring and control represent mature technologies with clear business models. Still, an efficient Traffic Management integration into multimodal MaaS has not been attempted.

The recent growth of cities is facing some criticalities, which are greatly affecting daily urban mobility. The car density with respect to the surface of the city; the urban structure that prevents radical viability transformation; the tourism flow (although usually concentrated in specific periods of the year); the inefficient use of the vehicles, and the daily people flows from the suburbs to downtown and vice versa, are some of the factors that contribute to the rise of environmental, mobility and social costs which are becoming difficult to sustain for today's cities. Cities, in their attempt to address these issues, are beginning to outline clear targets across the above-mentioned three pillars of sustainability.

A simple example of how MaaS can address these issues is the MaaS Global's revolutionary mobile app (Whim), which liberates people from timetables, fixed routes, parking worries and the high costs of owning a car. Born out of a need to be spontaneous, it gives people access to a huge variety of transport options. MaaS Global is bringing into reality the concept of MaaS, by building the world's first mobility ecosystem (4).

One example of a TM2.0 best practice is Social Traffic Management, which is described later in this paper. Social Traffic Management builds on a personalized traffic information service and traffic management platform, that is based on mainstream social media, and aims to best match demand and supply with the intend to improve travellers' comfort and ease road congestion. However, the combination of TM 2.0 and multimodal MaaS is still an open issue and is therefore addressed in MyCorridor.

The document is organized as follows: a first part describes TM2.0 and provides an example of best practice, while a second part is dedicated to its employment in the MyCorridor project, as an enabler of MaaS. Last but not least, the concluding part is highlighting the interactions and synergies among these initiatives, as well as their bilateral evolution.

### **TM2.0 concept**

TM2.0 stands for a new proven collaborative concept for Traffic Management and Control (TMC), in which the travellers and goods, by using new technologies and sensors, become entirely part of the data supply chain ([www.tm2.0.org](http://www.tm2.0.org)). It offers great new opportunities for Traffic Management and Control making it, on one side, cheaper and more efficient for the road operators, and, on the other side, more custom, friendly and acceptable for the users. This is accomplished by combining effectively data collected by the infrastructure and from the mobility services in the vehicles and smartphones.

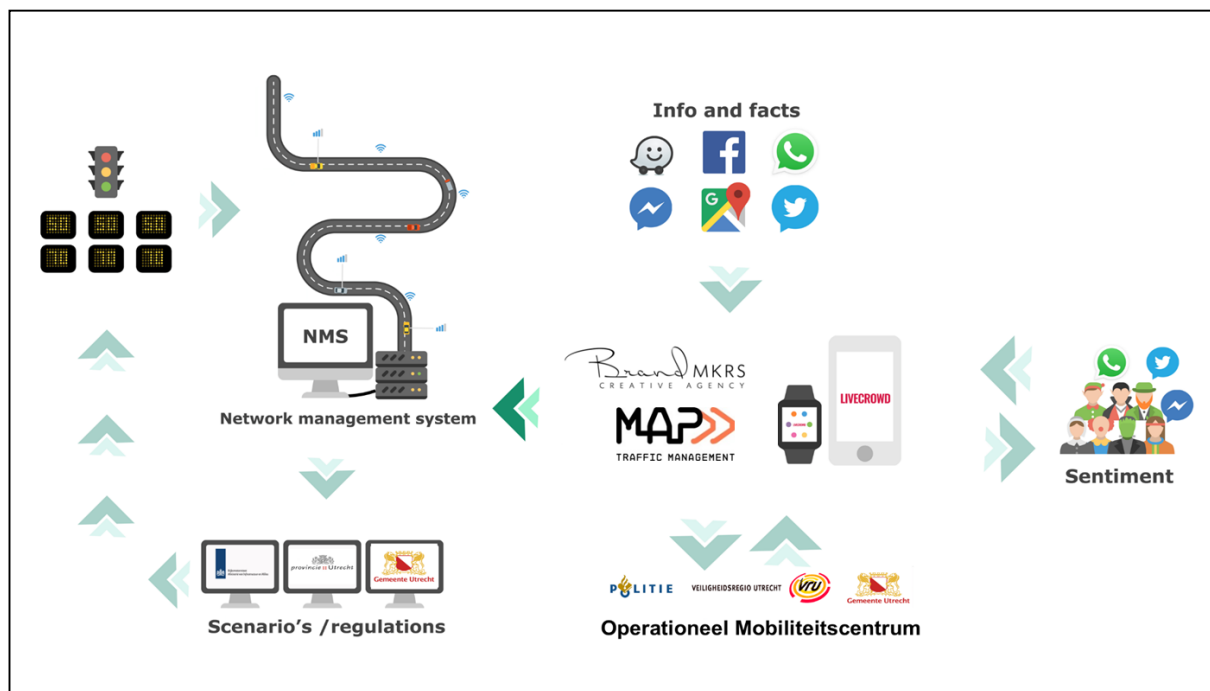
TM2.0 as an enabler of MaaS and its employment in MyCorridor

Current navigation systems in the vehicle use traffic information to provide individual route advice to drivers, however, missing the information related to traffic circulation strategies, traffic regulations or prioritized routes put in place by the TMCs. This is especially the case when extraordinary events are in place (planned or unplanned), such as important sport or cultural events, demonstrations, constructions or public transport strikes, but also when specific plans need to be enforced, e.g. in cases of smog warnings, evacuation alerts, or low-emission zones.

Therefore, according to the vision of TM2.0, the future of traffic management is to combine intelligently the individual driver objectives (individual users' optimization) together with network wide management strategies (system optimization and equilibrium) in a win-win scenario.

### **TM 2.0 Best Practices**

Social Traffic Management is one example of a TM2.0 best practice which builds on a personalized traffic information service and traffic management platform, that is based on mainstream social media, and aims to best match demand and supply with the intend to improve travellers' comfort and ease road congestion. One of the tools of the Social Traffic Management approach is to actively connect to target groups, often through existing social media communities and platforms, which are generally related to a specific location or event. This approach was successfully applied at the ArenaPoort area in Amsterdam, which includes a football stadium and several concert venues. By acting as a service provider towards these visitors, they were pro-actively informed about travel options, traffic flow, accessibility, time tables, parking options, etc. Reversely, visitors were able to contact the Social Traffic Management service centre by using their preferred social media channel (e.g. Whatsapp, Facebook Messenger, Twitter, etc.) to ask for specific information related to their mobility needs (for more details see Vreeswijk et al., 2017). No additional app download is ever required. An important added value of the traffic centre is that detailed knowledge of the traffic system of the area is available and continuously monitored in real-time. This allows to immediately anticipate to any type of delay or disruption and provide pre- and on-trip information to travellers. This goes for a range of scenarios, including public transport options considering occupancy, preferred walking routes, dynamic Kiss&Ride locations and approach routes, parking recommendations considering accessibility next to availability, etc.



**Figure 1 - Social Traffic Management approach.**

In 2017, during a concert series on three consecutive nights, a little more than 64.000 unique visitors were reached, mainly through Whatsapp, Facebook, for one-on-one communication and Twitter for common messaging towards a larger audience. The feedback received is very positive. The unique service of Social Traffic Management at large events helps people who are unfamiliar with the area around the event. Most questions are routing and traffic related, whether by car or public transport. After the event, the subject on the Social Traffic Management channel shifts back to routing and traffic information. People want to know the quickest route home, where to pay their parking ticket, what to do when a ticket is lost or the ticketing machine isn't working correctly. Social Traffic Management is also targeted by partners and friends who are coming to the venue to pick up relatives.

In March 2017, Social Traffic Management has been deployed as the primary communication tool for road works that had a great impact on traffic during one specific weekend. The original plan was to deploy Social Traffic Management for the duration of the road works, i.e. from Friday until the next Monday morning. Accordingly, the road operator communicated the availability of Social Traffic Management during these 3 days one week before, with the strict notice that it would be available from Friday. However, from the moment the notice was published questions were coming in. Questions were mostly from people planning their trip to Schiphol Airport and who were in need of clarification and/or assurance of the impact of the road works on their trip. Others were in need of more local route information, not even passing the road works but anticipating the effect on the local road network. A group of people were interested in the road layout after the road works which was going from 3 to 6 lanes through some complex interchanges at certain points. By providing up-to-date and personal travel information before and during the roadworks Social Traffic Management has been able to help users avoid traffic and delays and thereby, also easing traffic for other road users. During this Social Traffic

TM2.0 as an enabler of MaaS and its employment in MyCorridor

Management deployment, it also became apparent that the Social Traffic Management community is very much engaged with the information given (via Twitter) and distributed the information even further resulting in engagement rates of well over 15% on Twitter.

During deployments of Social Traffic Management, at events or roadworks, evaluation shows that most users are pleased to get a personal and quick response to whatever question was asked. Experience is that travellers with a higher rated user experience are more likely to comply to travel recommendations they receive. This offers a huge potential to traffic management and adding more traffic management orientated features is expected to further strengthen the effect Social Traffic Management can have on the traffic network.

### **TM2.0 as an enabler of MaaS**

As described in previous works (2), the scope of TM2.0 includes business models, deployment steps, public-private cooperation concepts, organisational architecture, and data exchange principles related to the interaction of the following services:

- Mobility services (individual routing, individual information and advice, high quality real time and reliable services, interfaces to other modes of transport).
- Road traffic management (traffic management and control strategies, collective routing, adaptive and dynamic traffic control, traffic management procedures, interfaces to other modes of transport).
- Data collection (privacy, security and data collection, journalistic, static and dynamic data, probing, dynamic location referencing, update of the Local Dynamic Map (LDM)).
- Legacy and evolution of current systems (integration of traditional and Probe Vehicle Data (PVD)).

The traffic management industry offers well-proven ITS solutions for improving traffic flow and safety using a large diversity of sensors along the roads. Traditional traffic data collection and monitoring (e.g. flow, speed, acceleration), including floating car data (FCD), is a mature technology with a clear business model. Nevertheless, today, traffic management plans (TMP) are not part of the dynamic traffic information delivered to the vehicles. At the same time, the individual vehicle behaviour (intended, in relation to the route guidance system plans) is not made available to the traffic management system.

Still, an efficient TMC integration into multimodal MaaS has not been attempted yet. The concept of Traffic Management 2.0 (TM2.0) builds upon the deployment of connected vehicles and travellers in order to achieve convergence of mobility services and traffic management, combining actions of the individual travellers with the collective mobility objectives. This way, TM2.0 connects the innovative developments in the vehicle and on the road while improving the value to the legacy systems and, at the same time, creating new business opportunities; a new business paradigm shall be deployed in which TM becomes part of the multi modal service offering of a MaaS product. The TM2.0 approach

TM2.0 as an enabler of MaaS and its employment in MyCorridor

is based on the view that integration produces amplified impact through the enabled synergies (1+1>2).

## **Employment in MyCorridor Project**

### *MyCorridor Project*

MyCorridor is a 3-year project, funded by the Horizon 2020 programme and its overall objective is to achieve sustainable travel in urban and interurban areas and across borders by replacing private vehicle ownership by private vehicle use. The project looks into connecting services from various service providers and providing the traveller with alternatives to replace their own vehicle trip with combined shared vehicles and multimodal transport solutions. The project is part of the Mobility as a Service (MaaS) concept that puts users at the core of transport services, offering them tailor-made mobility solutions based on their individual needs.

The work in MyCorridor is based on the concept of Traffic Management 2.0 (TM2.0) (2) to be extended beyond the Traffic Management world by providing a solution that incorporates multi-modal, seamless, flexible, reliable, user-friendly, all inclusive, price-worthy and environmentally sustainable travel at cities and regions and most importantly across all Europe.

Pilot demonstration of MyCorridor involves an eco-system of interoperable MaaS aggregators, covering together a cross-border Pan-European Corridor going through Greece, Italy, Austria, Czech Republic and the Netherlands. Each MaaS aggregator can operate one or more local or cross-border corridors that involve various typologies of mobile users. MyCorridor aims to be all-inclusive, and, as such, cover the needs of all types of travellers with varying profiles (needs and preferences). Basic user profiles – representing a significant share of the population - that will be supported during the Pilots of the project through the MyCorridor system are namely: 1. The “Commuter”; 2. The “Tourist”; 3. The “Businessperson”; 4. The “Spontaneous user”; 5. The “Mobility-restricted” user (i.e. user with disabilities); 6. The “Low IT literacy user”.

### *TM2.0 in MyCorridor*

My Corridor aims to enable a paradigm shift for car users, by driving the “vehicle world” towards Mobility as a Service (MaaS): it aims to extend the Traffic Management 2.0 (TM2.0) at its borders by providing a solution that incorporates multi-modal, seamless, flexible, reliable, user-friendly, all inclusive, price-worthy and environmentally sustainable travelling at cities and regions and most importantly across all Europe. However, the basis of My Corridor project is the TM 2.0 concept (i.e. as an enabler of MaaS), and therefore starting point are those mobility services related to the interactive traffic management targeting the “vehicle world”.

These mobility services are clustered in four basic operational fields, which are 1) Traffic management applications, 2) MaaS Multi-modal PT applications interfaces concerning the planning, booking, ticketing and the use of the mobility multi-modal services, 3) MaaS vehicle related applications, and 4) Horizontal (non-mobility) services concerning the purchasing.

TM2.0 as an enabler of MaaS and its employment in MyCorridor

TM2.0 acts here as a foundation, enabling key services in each operational field, that are namely:

- Parking availability information.
- Route planning.
- Real time traffic state and forecast.
- Event management.
- Advanced traffic forecast provision.
- Zone access information control provision.
- Traffic light forecast.
- Traffic events.

### System design

MyCorridor project aims to implement the TM2.0 concept as an enabler of the MaaS trend and vice versa extending the TM2.0 concept from car owners to multi modal travellers (incl. ticketing, payment, etc.).

In this way, MyCorridor will lead to TM2.1, that stands for a new interactive concept for Traffic Management and Control, in which the travellers by using new technologies and sensors, become entirely part of the multimodal data supply chain. In addition, traffic management operators work together with the MaaS operators to optimize the transport road capacity through the implementation of common interactive transport management measures across all the available different transport layers.

The picture below represents this interaction among all the transport actors, where they cooperate to achieve common transport objectives.

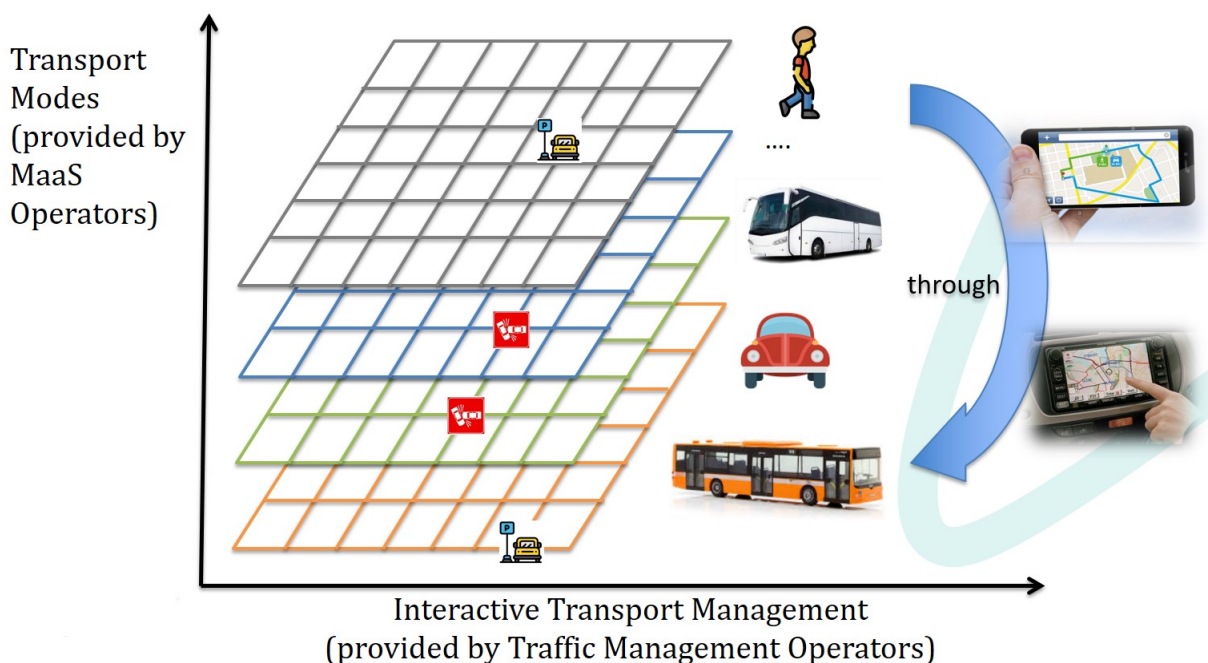


Figure 2 - Example of Interactive Transport Management across different transport modes.

TM2.0 as an enabler of MaaS and its employment in MyCorridor

Some practical examples of “multimodal” “interactive” transport management (TM2.1) are reported below, starting from the basic TM2.0 scenario until the TM2.1 one:

- **Basic TM2.0 business scenario:** The combination of traffic data from Traffic Management Operators and navigation service provider (FCD) can generate post processed traffic data, such as: travel time and level of services forecast, current level of services and travel time, traffic light forecasts as well as traffic management measures to optimize the traffic flow network, such as: alternative route guidance, open/close preferred lanes, road speed limits.
- **Interaction of TM2.0 with MaaS:** Data elaborated are provided to MyCorridor MaaS platform for mobility service provision to travelers. The end user gets homogenized information from all possible service channels, for example, VMS, PNDs and My Corridor application.
- **Enhanced Traffic Management scenario (TM2.1):** The Traffic Management Operators could indicate a capacity drop within their network, which they cannot solve with only Traffic Management measures. Thus, they ask the MaaS operator to switch travel demand onto a different travel mode or modes provided by the Service Provider's based in capacity and pricing, with respect to the user's business role in order to avoid the capacity drop. The switch can be achieved through information push, and/or incentives (e.g. discounts) in combination. One example is park and ride information and discount offer.
- **Car sharing and TM2.0:** MaaS schemes can combine car sharing services with TM2.1 scenario for reasons of more efficient Traffic Management as well as complete mobility service management.

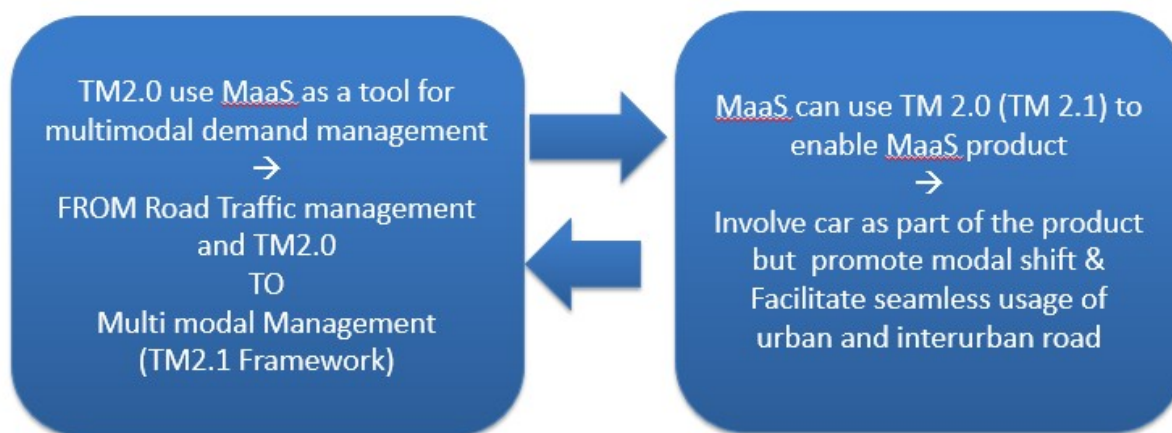
### Conclusions and next steps

The concept of Traffic Management 2.0 (TM2.0) builds upon the deployment of connected vehicles and travellers in order to achieve convergence of mobility services and traffic management, combining actions of the individual travellers with the collective mobility objectives. MyCorridor project aims to implement the TM2.0 concept as an enabler of the MaaS mega trend, and vice versa extending the TM2.0 concept from car owners to multi modal travellers: TM2.1, that stands for a new interactive concept for Traffic Management and Control, in which the travellers through the use of new technologies and sensors, become entirely part of the supply chain.

Therefore, according to the vision of TM2.1, the future of mobility management is to combine intelligently the individual traveller objectives (individual users' optimization) together with network wide multi-modal management strategies (system optimization and equilibrium) in a win-win business model, namely the MaaS business model.

Finally, it can be concluded that TM2.0 is an enabler for the deployment of MaaS platforms but also MaaS trend is an enable for TM2.0 opening the door to the multimodal management (TM2.1 Framework) where “Interactive road transport management” can evolve in “Multimodal transport management”.





**Figure 3 - The convergence scheme of the TM2.0 and MaaS trend.**

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