Task Force 21: TM2.0 - Multimodal mobility

Final Draft version 3.1

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Executive Summary

The current report is a joint effort between TM2.0 and MaaS Alliance and has as its key focus Multimodal Mobility Management.

The content of the report are based on the results of a joint workshop organized by both entities and hosted by ERTICO in Brussels on 19 February 2020. The minutes and all results of questionnaire addressing the Workshop's audience are available upon request.

The members of both entities (TM 2.0 and MaaS Alliance) agree that all the transportation modes are becoming connected more and more and that, multimodal mobility management will play a key role in offering seamless journeys for the road users.

In this framework, MaaS can serve as a key to reduce traffic congestions. Prediction which can lead to proactive rerouting is a challenge for traffic management and there is still much space for solutions to be developed. However, the solutions, should be impact driven. KPIs should be defined from different points of view with regards to impact while decisions on the provision of policies and priorities must be made according to the potential benefits for different players, including private service providers and users. In case of the latter, incentivization is an important tool to influence user behaviour in favour of traffic management plans. Local, national and regional governments should be supportive of these kinds of initiatives and their changing role in the ecosystem is an issue that needs to be addressed properly. Both mobility patterns and human behaviour need to be studied in order to understand how to best nudge people's behaviours towards their use of the various modes of mobility. Effort and further research should be made in order to understand how to a) quantify the negative externalities and the propensity and willingness for stakeholders to participate in such a system and b) render existing business cases for more interoperability between MaaS Solutions and traffic Management applicable and effective.

TM 2.0 short description	MaaS Alliance short description
• Develops a Public-Private cooperation model (TM 2.0 win-win-win concept) on interactive traffic management • The Platform's thematic papers have been feeding into the EU Delegated Acts, the C-ITS Platform and STRIA. • The Platform members have already worked on 18 Task Force reports while 3 more are expected in September 2020. • The Platform aims to align Public Authorities and Industry (public and private mobility stakeholders) on working towards cooperative models for interactive TM. • The target is to elevate the priorities of environmental and social targets that public authorities prioritise on, to the level of importance for all	• Global public-private network that support the development of an open ecosystem and single market for MaaS • The Platform members have produced a White paper on MaaS Vision (2017) which has contributed to setting the basis of what MaaS is and what future should be envisaged. • More recently the MaaS Alliance has been creating tools and policy guidance for cities to implement MaaS and supported the creation of synergies between MaaS and Traffic Management. • It also works towards setting a framework for assessment of environmental impacts of MaaS as well for a technical interoperability of

TM 2.0 short description	MaaS Alliance short description
stakeholders based on a common understanding for cooperation among stakeholders who may also continue competing with each other (principle of co-opetition). • USP: Win-Win-Win model for Traffic Management www.tm20.org	MaaS services to build the capabilities to ticketing integration for MaaS. • USP: The widest global network for Mobility as a Service, with the leading companies and the most advanced public authorities www.maas-alliance.eu

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Abbreviation List

TM	Traffic Management
TM2.0	Traffic Management 2.0 Innovation platform
TF	Task Force
MaaS	Mobility as a Service
ITS	Intelligent Transportation Systems
IT	Information Technology
C-ITS	Cooperative Intelligent Transport Systems and Services
POI(s)	Point(s) of Interest
CO2	Carbon Dioxide
KPI(s)	Key Performance Indicator(s)
OEM(s)	Original Equipment Manufacturer(s)
URL	Uniform Resource Locator
TMP(s)	Traffic Management Plan(s)
MMITS	Modular Multifunction Information Transport System
TISA	Traveller Information Services Association
FCD	Floating car data

1. Introduction

As travel demand increases and changes, cities continue to improve the planning, development, and operation of their multimodal transportation systems and as a result, the creation of a multimodal mobility management system is necessary. Combining data, information and several mechanisms of traffic management with the mobility as a service's ones, we can reach the desired high level of mobility management by focusing on and empowering the efficiency and sustainability of mobility.

This Task Force (TF), initiated by TM2.0, and co-organised with MaaS Alliance, aims to gather forces from both communities towards the aforementioned goal. Both sides will cooperate closely to develop a set of common business and strategic objectives to successfully pave the way for sustainable and efficient mobility of humans and goods.

The TF will elaborate on the links and try to build a common path between TM and MaaS. It will show how TM is evolving towards embracing other modes of mobility with main focus on a seamless passenger travel. The TF aims to understand and bond multimodality in the context of TM and show how the use of different transport modes influences and impacts traffic in terms of planning and management. The TF will focus on, examine and address the (peri-) urban transportation ecosystem as a whole.

The results of the work will derive by building on top of the results of the previous taskforce on TM 2.0- MaaS and evolve on how the two concepts can integrate effectively to support Multimodal management.

1.1. Background

Typically, the urban planning framework helps the transformation of a vision into implementation, using space as a key resource for development and engaging stakeholders along the way. Sustainable, inclusive, prosperous, and resilient cities depend on transportation that facilitates the safe, efficient, and pollution-free flow of people and goods, while also providing affordable, accessible, healthy, and integrated mobility for everyone. The pace of technology-driven innovation from the private sector in shared transportation services, vehicles, and networks is rapid, accelerating, and filled with opportunity. At the same time, city streets are a finite and scarce resource.

The multimodal mobility behaviour targets to eventually help city authorities optimize traffic management and make more efficient use of the available capacity from the different transport networks and modes available to their citizens. Multimodality serves also as the basis for MaaS, since the MaaS concept based on the combination of different transport modes according to the situation and to the available transport means.

While MaaS is concentrated mostly on delivering mobility services to travellers, it can also be a tool for data sharing between MaaS operators, transport service providers and TM, as well as a tool to influence users' demands and preferences for travel. **Predicting and adapting to passengers' flow variations and needs, and even being in position to manipulate them with incentivization techniques could act as a means to regulate traffic flows, respond on the road network's bottlenecks and handle sudden incidents in real time.** It is also the key to planning TM measures in advance. Furthermore, the concept of MaaS also brings new subjects to the scope of TM as it expands beyond vehicles covering also users of public transportation, cyclists, and even walkers. So,

a common migration path would create value and pave the way towards more sustainability in mobility. This concept has been initiated in the framework of the HORIZON 2020 project "Mobility as a Service in a multimodal European cross-border Corridor" (MyCorridor), and it has been also the basis of the 2019 TM2.0 Task Force on Traffic Management and MaaS (see Annex 8.3).

1.2. Objectives of the Task Force

Multimodal Mobility Management is a concept to promote sustainable transport and manage the demand for car use by changing travellers' attitudes and behaviour. Focus of this Task Force will be drawn on the concrete definition of the city's mobility ecosystem, as it is crucial to have this properly defined as a starting point and elaborate further on it. The final goal is to achieve sustainable (multimodal) mobility in urban and peri-urban areas.

The taskforce aims to combine the dynamics of interactive Traffic Management (TM2.0 concept) with the concept of Mobility as a Service and promote collaboration of both into forming the novel act on the creation of the Multimodal Mobility Management framework focusing on movement of people and goods in a more effective and efficient way. Multimodal Mobility Management should focus on people rather than vehicles and provide valuable information for people to choose multimodality.

Multimodal mobility management may help city authorities optimise traffic management by making more efficient use of the available capacity from the different transport modes and as a result improve road network efficiency. In this context, MaaS can be a tool to regulate traffic flows, respond on the road network's bottlenecks and handle sudden incidents in real time as well as to planning TM measures in advance, by:

- Data sharing between MaaS operators, transport service providers and TM.
- Influencing users' demands and preferences for travel.
- Supporting seamless journeys for city road/network users with minimized overall delays (improve user transport experience)

A lot of topics will be discussed around MaaS and TM2.0 as well as ways to gain user involvement so that added value can derive for the services, since in general for a product made for end users, to be considered as successful, the user acceptance and involvement is critical. In a nutshell, traffic management operations aim to migrate to the emerging Multimodal Mobility Management system rendering MaaS an integral part of it.

1.3. TM2.0 & MaaS Alliance Workshop

The Task Force has worked through a Workshop held 19 February 2020 in Brussels: "MaaS and Multimodal Mobility & Traffic Management". The workshop, which was organised by both the TM 2.0 and MaaS Platforms, concerned the integration of Traffic Management (TM) and Mobility as a Service (MaaS) into a single operational framework with the purpose of delivering Multimodal Mobility Management and Services, mainly at Urban Environment.

The following key topics were discussed during the workshop:

- Definition of the Mission statement: Sustainable and efficient movement of people and goods.
- Definition of the contextual TM & MaaS cooperation requirements

- Proposition of an integrated operational scheme for TM & MaaS co-existence.
- Examination of the possibility for a common data/information exchange framework
- Identification of the key stakeholders as a starting point to a multimodal mobility management Business model
- Identification of the technical, business and market barriers for the integration between TM & MaaS
- Examination of incentivisation strategies for wider adoption, user acceptance & market uptake

The Workshop contributed to the purposes of the Task Force as follows (results of polls during the Workshop are presented in the Annex):

- Provided interaction with stakeholders from Traffic Management and MaaS:
  - Mobility service providers
  - MaaS Service providers
  - City Authorities
  - Traffic Managers
  - Traffic Planners
- Feedback was received on specific assumptions and input to report
- Merged the opinions of Mobility operations, Traffic Management operations with the Urban planners and Policy making

1.4. Content of the Report

The first chapter of the report serves as the introductory part, pointing out the background and the objectives that the initiative aims to provide.

The second chapter provides a conceptual description of the Multimodal Mobility Management innovation by first introducing the idea behind multimodality in transportation and the initial definition of what a Multimodal Mobility Management system will be. Continuously, primary and secondary stakeholders around this system are identified and finally the chapter summarizes what this innovative idea is aiming to deliver.

The third chapter examines the concept of Multimodal Mobility Management from a Traffic Management perspective, pointing out how Traffic Management can benefit from the integration of the TM2.0 and MaaS concepts. It also focuses on what are the impacts and changes/adaptations required from the view of Traffic Management to support the collaborative work.

Similarly, the fourth chapter examines the concept of Multimodal Mobility Management from a Mobility as a Service perspective, pointing out how MaaS can benefit from the integration of the TM2.0 and MaaS concepts. It also focuses on what are the impacts and changes/adaptations required collectively by MaaS to support the efforts.

Chapter five brings together for the first time both the Traffic Management and Mobility as a Service concepts. It presents the drivers and barriers for the integration of these schemes and tackles the necessity for data sharing. It also addresses the matters of user acceptance and adoption and sketches out the key benefits of interoperability.

Chapter six outlines the Multimodal Mobility Management business case and provides an initial representation of the respective business model, beginning with the business architecture. Following, the drivers and barriers per stakeholder identified are being discussed. Finally, the importance of incentives is acknowledged and strategies related to bring more user involvement are considered.

The final concluding chapter provides a summary of the report with focus on the key points and benefits of the interoperable scheme development.

The Annexes chapter comes after the documents conclusion and presents briefly the TM2.0 concept and the Innovation platform TM 2.0, followed by the MaaS concept and the alliance that MaaS providers and stakeholders have formed (MaaS Alliance). The results of a past taskforce on TM2.0 and MaaS, which can be perceived as pioneering the work of the present taskforce, are also discussed. Finally, the results of the fruitful workshop performed jointly by TM2.0 and MaaS Alliance are included in this section.

2. Towards Multimodal Mobility Management

2.1. Introducing Multimodality

Most European citizens are living in an urban environment, sharing a common transportation infrastructure. Most everyday journeys begin and end in cities. The traditional demand for urban mobility, which is usually dependent on car ownership and usage, most of the times leads to severe congestion issues, poor air quality, noise emissions and high levels of CO2 emissions.

At the moment, according to European Commission's Mobility and Transport department[1] it is estimated that urban mobility accounts for about 40% of all CO2 emissions of all road transport. In order to successfully enhance mobility but at the same time reduce traffic jams, accidents and pollution the multimodal mobility concept needs to be promoted and supported.

Complemented with swiftness and increasing accuracy from traffic managers and the relevant services available, so that people can manage information flows before and during their trips, sufficient and smart multimodal mobility management schemes can be developed, introducing the next era of intelligent urban transportation systems.

Sustainable, inclusive, prosperous, and resilient cities depend on transportation that facilitates the safe, efficient, and pollution-free flow of people and goods, while also providing affordable, healthy, and integrated mobility for all people.

The pace of technology-driven innovation from the private sector in shared transportation services, vehicles, and networks is rapid, accelerating, and filled with opportunity. At the same time, city streets are a finite and scarce resource.

From this perspective it is advantageous for cities and regions, in order to sustain current accessibility, or to grow for future demand, to consider all transportation modes and networks holistically. It can no longer be seen to be effective to manage the public transportation modes and operations separately from that of road network management. The two systems have a symbiotic relationship and as such need to be considered as a whole from a human-centric, not a vehicle-centric point-of-view

This section defines the concept of Multimodal Mobility Management and principles, identifies the key stakeholders within the ecosystem and provides a high-level analysis of the benefits of Multimodal Mobility Management.

2.2. Defining Multimodal Mobility Management

Multimodal Mobility Management is the administration of all solutions and policies within a given region or city, that provide management or policy over a given form of mobility, that when combined provides a holistic perspective of all modes and methodologies as to optimize for the complete network and not individual sub-systems of that network.

[1] https://ec.europa.eu/transport/themes/urban/urban_mobility_en

The benefits of Multimodal Mobility Management will allow a city or region to optimize complete flows of users while providing data and insights to help the users of the system understand their complete journeys.

Components considered in the scope of Multimodal Mobility Management are:

- Public Transport Services (bus, light rail, heavy rail, ferries, etc.)
- Road Network Management set of actors (TMCs, Road operators, Service Providers, OEMs, Infrastructure service providers)
- Sharing and Short-Term Vehicle Rental (both point to point and station networks)
- Mobility as a Service (MaaS)
- Mobility-on-Demand (MOD)
- Road User Charging Mechanisms (including Congestion charging, low emissions zones and zone access control)
- Autonomous Transport Systems
- Freight and Logistics
- Drones and Low Altitude Aerial Mobility

2.3. Stakeholders Involved in Multimodal Mobility Management

This section lists the primary and secondary stakeholders (benefactors) around the Multimodal Mobility Management ecosystem.

2.3.1 Primary Stakeholders

The following have been identified as the primary stakeholders for Multimodal Mobility Management

- MaaS Operators
- Traffic Management Authorities
- Public Transport Operators
- Public Transport Authorities
- Public Transport/Road Users (Passengers)
- Logistics/Freight Operators
- Parking Operators
- Private Mobility Service Providers (Taxi, Ride-hailing, ride-sharing, etc.)
- City Transport Network Management Operators
- Information - application service providers
- Multimodal Transport Authorities
- Local/Central Government

2.3.2 Secondary Stakeholders

The following list has been identified as possible secondary stakeholders who will also benefit from Multimodal Mobility Management.

- Urban, Transport and Land-Use Planners
- Policy makers:
    - Environmental
    - Socio-Economic
    - Healthcare
- Curb side Management Stakeholders
- Traffic Network Maintenance Operators

- Emergency & rescue services
- Open Data Advocates
- Business/Commerce

2.4. Multimodal Mobility Management Ambition of Delivery

To develop Multimodal Mobility Management, first comes the need to identify the data and processes that need to be shared primarily between the Traffic Management systems and the Public Transport/MaaS systems.

Data sharing from multimodal operations, for example real time fleet positioning, can potentially support in efficient traffic management. MaaS can become the "tool" to integrate TM operations at neighbouring geographical locations as well as with long haul public transport and Logistic operations and thus make it more inclusive and comprehensive. Traffic management data flow to multimodal service providers can influence the journey planning of the modes of transportation resulting in better road efficiency and can be an important add on to MaaS applications. Considering the building of a multimodal mobility management system integrating flows from both parties, it is easily understood Traffic management and Mobility as a Service (MaaS) can cooperate and offer relevant services to each other towards the goal of structuring a reliable multimodal mobility management scheme.

Certain types of data that can be shared from the MaaS ecosystems and could possibly assist a Multimodal Mobility Management scheme are:

- All Multimodal route requests
- Actual and forecast passenger loads for mobility service providers
- Journey planning and booking information (On-demand booking and changes to transport or accommodation)
- Public transport services purchases
- Car sharing and taxi reservations
- Bike sharing trips
- Real time vehicle location information (telematics)
- Mobility Service alerts
- Departure alarms
- Freight services
- User Feedback
- User data (such as probe data, mobility preferences, personal travel behaviour, trip and wait times, and CO2 footprint)
- Origin and destination data for analysis
- Total costs of mobility analysis
- Road outages and obstructions (Information about road outages and obstructions – position, description, estimation how long it will block the traffic)
- Public Transport Stop Points (Logical representation of public transport stop places referenced from timetables)
- Railway Network (For railway, metro, trams)
- Footpath Network (Graph data of footpath network (pavements, pathways and roads, suitable for pedestrians)
- Bike Network (Graph data of bike network (bicycle lanes and roads suitable for bicycle))
- Public Transport Lines (Sequence of stations/stops)
- Public Transport Timetables (Regular timetables on Public Transport lines)
- Points of Interest (POIs) (Information about POIs – coordinates, type, description, URL)

- Weather Information (used in trip planning)
- Delays and disruptions (Information about delays in regular Public Transport timetables and disruptions on Public Transport lines)
- Parking places with capacity (Information about parking places – coordinates, type, description, total capacity, remaining free capacity (if available))
- Accidents (Information about accidents – position, description, estimation how long it will block the traffic)
- Scheduled mass events

Some types of data that can be shared from the traffic management ecosystems and could possibly assist a multimodal mobility management scheme are:

Adaptive and dynamic traffic control:

- Adaptive and dynamic traffic control
  - Historical probe data (Analysis of the impact of the traffic management control & decisions)
  - Probe data (To be aggregated on a traffic management control & decisions as an additional source of real-time sensor information)
  - C-ITS services (Traffic light service such as speed advice, count down, Road hazard warning, In-vehicle signage)
  - Traffic management procedures
- Advanced navigation services:
  - Navigation services
  - Advanced navigation services taking TMPs into account
  - Advanced navigation services taking capacity into account for prediction purposes
  - Individual routing (Individual information and advice)
  - Delivery of individual information and recommendations to the road users
- Traffic status and event detection:
  - Congestion charging detection
  - Zone Access Control Areas
  - Detection of traffic relevant incidents
  - Probing
  - Detailed information on the current state of traffic
  - Speed profiles & Traffic Information Services for users/drivers, OEMs, Road Operators and Public Authorities

Obviously just sharing data is not the solution to the development of Multimodal Mobility Management systems and the coordination of policies and plans needs to be a central tenet of any potential solution. Stakeholders should no longer operate in isolation and must share their playbooks and planning schemes such that all stakeholders' requirements are accepted, reviewed, assimilated and balanced in a fair and equitable manner to deliver the optimum solution for the city and the individual traveller. Data sharing can be facilitated by setting minimum data quality criteria, providing equal opportunities in data accessing and combined efforts towards the creation of a common lexicon for communication between stakeholders' operating platforms, via standardisation procedures.

3. Multimodal Mobility Management from an interactive Traffic Management (TM2.0) perspective

3.1. How Traffic Management can benefit

As discussed thoroughly in the TM2.0 MaaS Workshop held on February 19th 2020, if we can migrate to Multimodal Mobility Management in the urban domain, Cities can achieve ***"sustainable and efficient movement of people and goods"***. More specifically, the ambitions of this transition are decarbonisation, sustainability, multimodality and quality services for the traveller. More than 90% of the audience agreed that MaaS and Traffic Management integrated operations can contribute to a multiple benefit for the Urban sustainability objective.

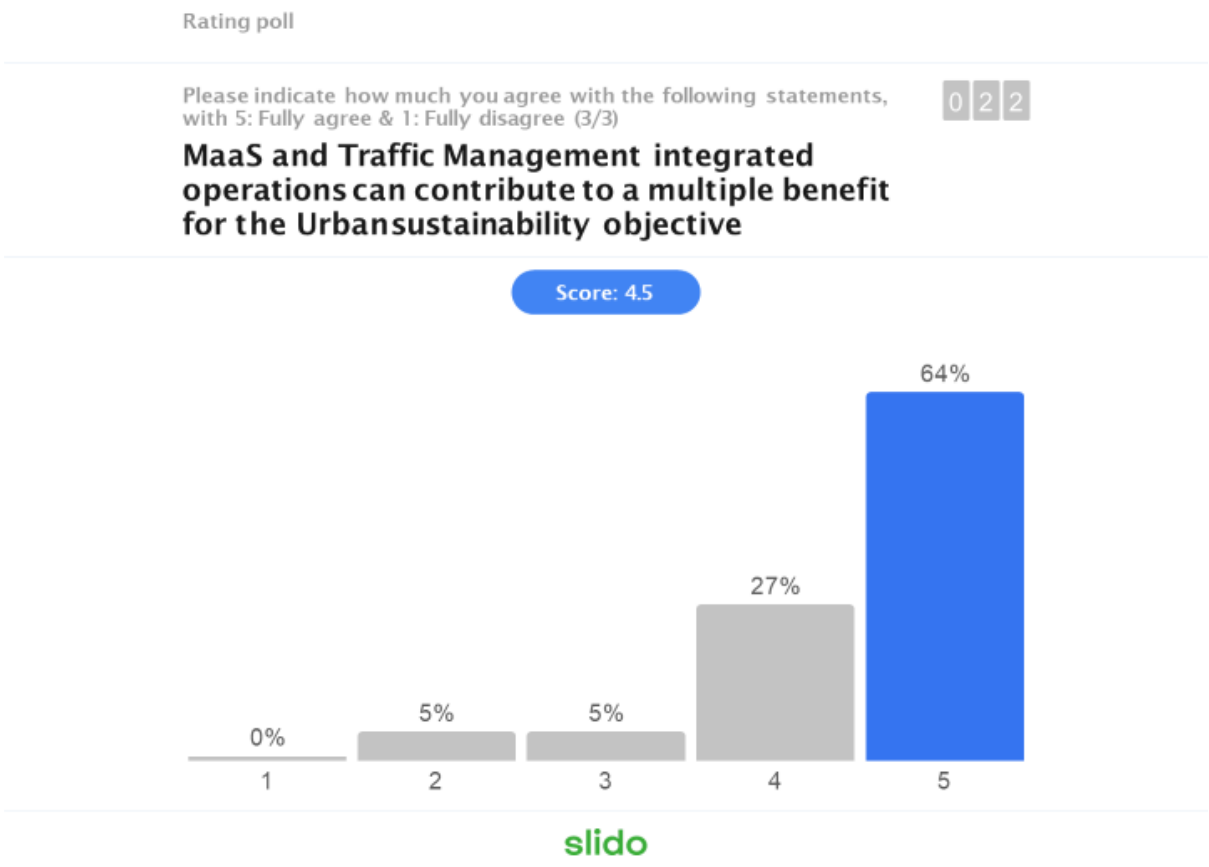

Figure 1: Workshop audience views on integrated MaaS and Traffic Management operations

However, there have been some doubts from the audience that this transition would be easy or even feasible, as there are different objectives set by the various stakeholders and most importantly different jurisdictional responsibilities held by public transportation and traffic authorities within the urban transport system which leave little room for cooperative ecosystem operations.

The general focus for discussion between the workshop attendees reflected the commonly held vision that **for MaaS and TM2.0 to effectively collaborate would demand information, data and priorities to be shared bi-directionally between the parties consisting the two entities**. It was also noted that the different key stakeholders (MaaS and TM2.0) tend to have a different set of goals and

a collaboration concept is highly recommended and required in order to improve overall road network efficiency.

In order to achieve a point of collaboration between Traffic Management, Maas (including Public Transport) and the individual user, there needs to be a robust business case that can achieve the TM 2.0 Win-Win-Win scenario for both the MaaS and TM 2.0 stakeholders.

It is essential starting from vehicle management to continue with transport management and end up as key focus with user's mobility management, in the context of multimodality. The user is not only the focal point of mobility but also creates added value on the services he/she consumes. An impressive 89% of the audience agrees that **Multimodal Mobility Management should focus on people rather than vehicles** and provide valuable information for people to choose multimodality, versus a 48% that believes that Multimodal Mobility Management should continue to focus on congestion and flows of different modes (private cars, public transport, ride-hailing and taxis, shared cars, bikes, micro mobility vehicles, walking and urban air vehicles).

3.2. Traffic Management operations in the context of Mobility as a Service scheme

Adopting the MaaS concept will institute a new era in traffic management, where traffic optimization measures can also be provided by mobility service providers and used to enable some advanced services to the end-users via MaaS applications, such as traffic data services related to forecast travel time estimation, forecast level of services, as well as interactive traffic management measures to optimize the traffic flow in the network.

While traffic management usually focuses on the road infrastructure and the users of it, mobility management covers all the means of urban transportation etc. In such a case, MaaS applications could be used to accommodate the multimodal mobility needs in an interchangeable manner. A relevant scenario is the following: if capacity levels drop (because of an accident or other incident) within the transport network and as such cannot be solved by traffic management measures alone, MaaS operators could be used to channel travel demand into a different travel mode or modes to optimize the flows in the network. Another example is that traffic managers increasingly use geo-fencing to control road traffic passing through designated parts of a network (i.e. residential/school areas, high polluting zones, hospital areas), MaaS operators can also enable the provision of geo-fencing by promoting sustainable modes to pass through such areas. However, MaaS is not just an additional information channel to users, as traffic management is not just another source of mobility information. In fact, integration between the two applications may have increased impact on the mobility efficiency of the city. Through this enhanced collaboration, on one side, the traffic management operators can acquire dynamic traffic data directly via the connected vehicles, and then use the capacity of the whole transport system to spread travel demand more efficiently. The traveller acquires enhanced quality of service (e.g. less time wasted, increased comfort, less anxiety, fewer accidents). In this context, later, it will also be worth studying how information from other sources, e.g. from transport service providers, fleet managers, or from event organisers, could be used in order to optimise the traffic flows and management in cities, through traffic management measures and advanced data-based urban and traffic planning methods. Furthermore, the introduction of a MaaS scheme can support the expansion of TM. During the workshop over 65% of

the attendees either agreed or fully agreed that MaaS schemes can be the catalyst in expanding TM in geographical space through the inclusion of multimodality management.

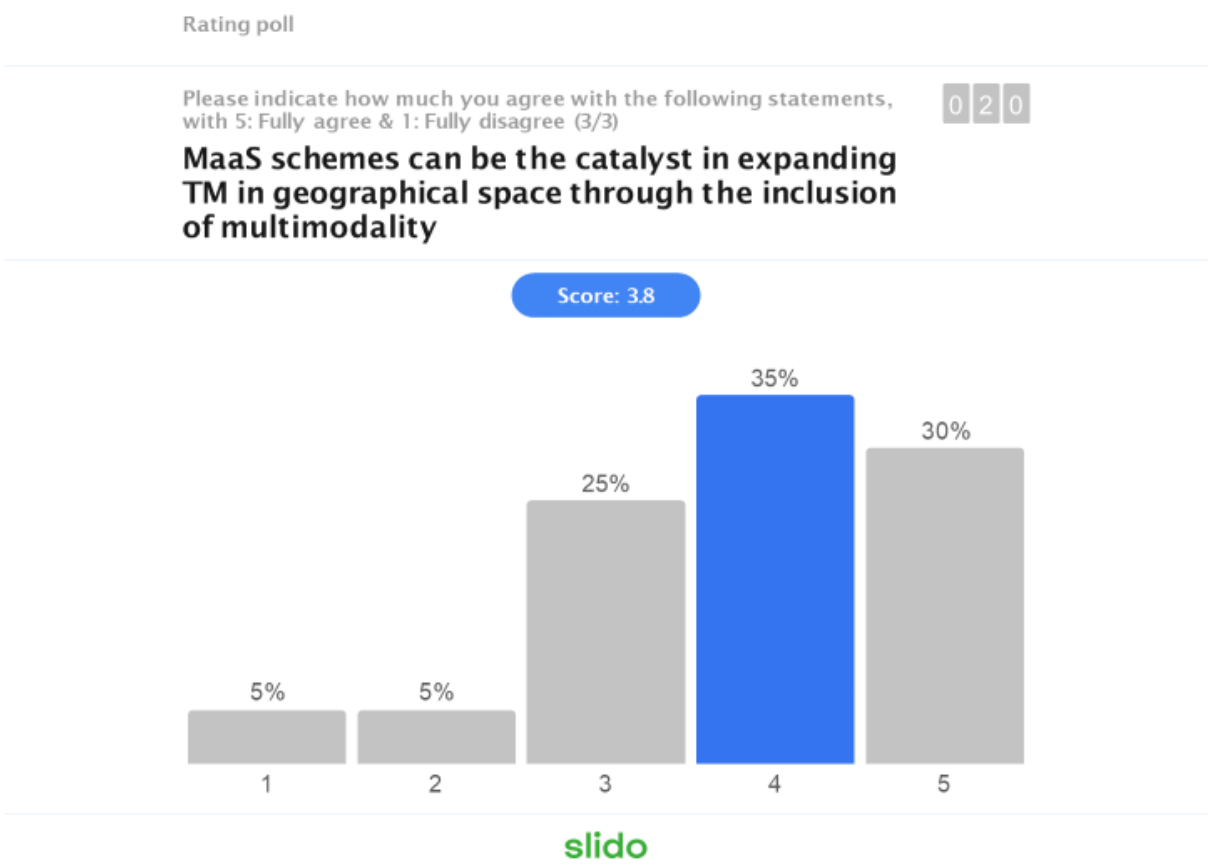

Figure 2: Workshop's audience opinion on the impact of MaaS schemes in TM geographical extension

3.3. What are the impacts and changes needed on Traffic Management?

TM2.0 already provides a novel scenario for interactive Traffic Management through the integration of Traffic Management Plans provided by Road Authorities, dynamic traffic information provided by Traffic service providers and guidance provided by navigation service providers. This is demonstrated in the following operational architecture by TM2.0, which presents the TM2.0 stakeholders' interaction. The TM2.0 stakeholders are: Road infrastructure owners, Road side service providers, content Service Providers, in car service providers and service consumers.

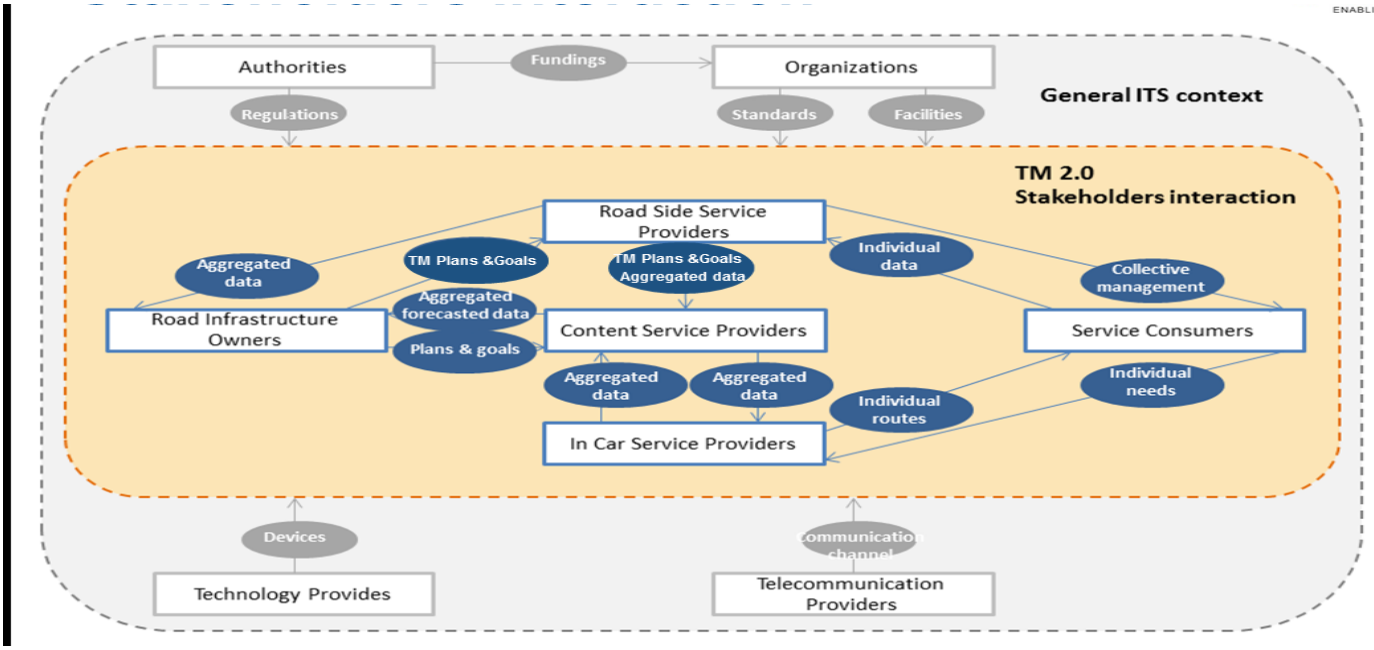

Figure 3: Original operational architecture by TM2.0

The current report foresees an extended TM2.0 scenario, in which the following levels of interoperability are being taken into account:

1. At the **first interoperability level**, the entire, original operational architecture envisaged by TM2.0 can be incorporated and/or interact with an independent MaaS operational scheme (consisting of MaaS service providers, mobility service providers, application service providers and Users); in this context service consumers (Users) could be the same in both schemes. *Stakeholders envisaged by TM2.0 can provide traffic and navigation services to MaaS, which acts as a mediator between Traffic Management and multimodal Mobility Users*.
2. At the **second interoperability level**, the same operational architecture envisaged by TM2.0 can be extended to include multiple types of service providers, one of which could be the MaaS service provider; *the MaaS service provider serves its own service consumers but also provides user feedback, multimodal transport demand forecasts and mobility operators real time data to the TM2.0 stakeholders (Road owners, and service providers)*.
3. At **the third and final interoperability level,** the operational architecture can be further extended to substitute the Road Infrastructure owners and Road side service with multimodal Transport/Mobility management stakeholders. In this case MaaS service providers are fully integrated into the operational architecture; The existing TM2.0 stakeholders continue to provide services as originally anticipated through in vehicle or even MaaS channels to the user, *but on top, the MaaS application contributes to the Multimodal Transport Management objectives by active management methods such as*:
    - Providing multimodal information and navigation
    - influencing end user behaviour towards sustainable use of the transport system (by means of information, or incentivization),
    - promoting less congested transport modes
    - mitigating unexpected incidents in the multimodal network by “pushing” demand to other modes

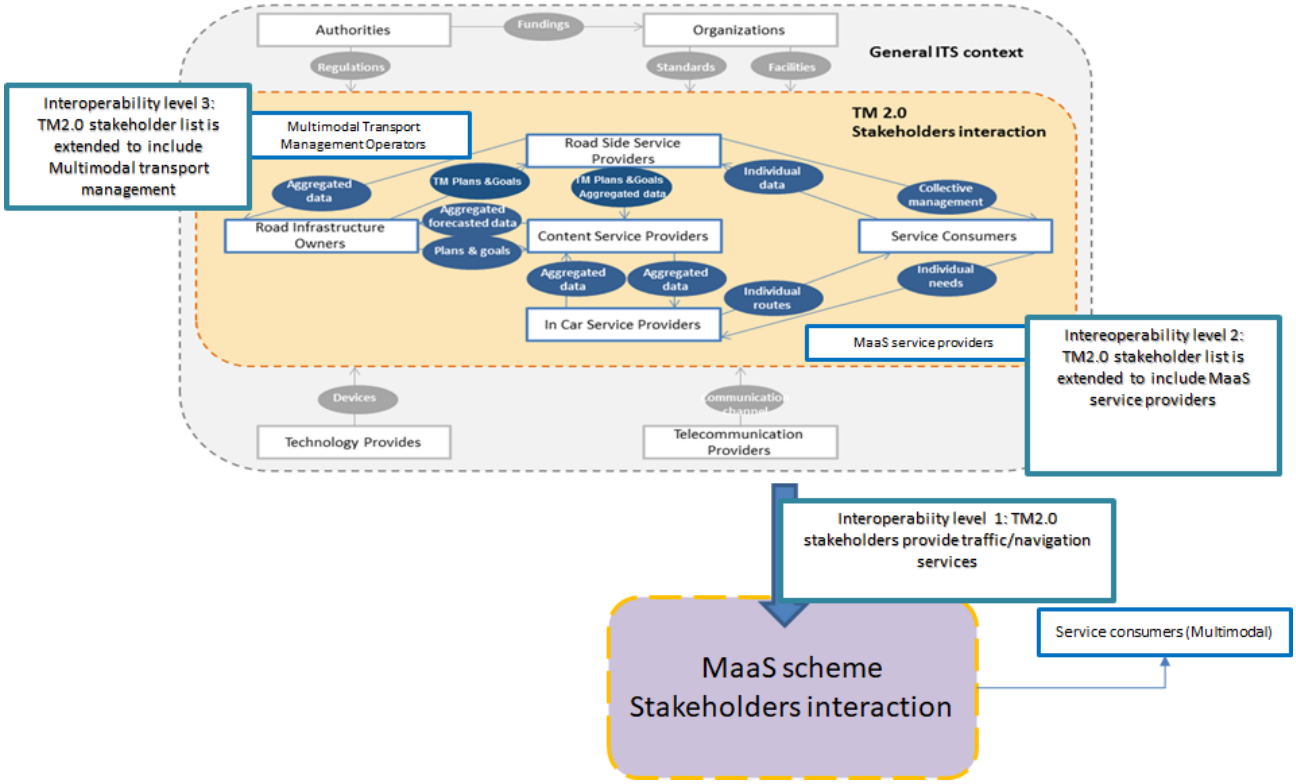

Figure 4: Extended operational architecture by interoperation between TM operations and MaaS systems

MaaS Service Providers may have similar role to the one the Traffic Service Providers have in TM2.0 scenario, but instead of "Enabling vehicle interaction with traffic management" (which is the current moto of TM2.0), will "Enable Mobility User interaction with traffic management" leading to a new TM2.0 paradigm (TM4.0!)

4. Multimodal Mobility Management from a Mobility as a Service perspective

4.1. How Mobility as a Service can benefit

As part of the TM2.0 MaaS Workshop previously mentioned, the afternoon session was focused on the implications and benefits to MaaS (and therefore Public Transport) of closer coordination and planning between the entities. The summary in this section reflects the outputs and discussion of that workshop and the detailed results from the polling that occurred can be found in the Annexes section of the document.

One of the key topics was the discussion around the business case around closer collaboration, coordination and interoperability between city MaaS providers/operators and Traffic Management. Data and their important role in terms of management and sharing was also a key focus area. Examples of data frameworks that enable data sharing were discussed, and reference was made to the EU wide ITS Directive that supplies a legal framework for data sharing in transport (all modes and all networks). **Stakeholders' costs related to data on the development and collaboration phase, were found to be considerable and must be estimated carefully.**

Win-Win-Win (city/traffic management/consumer) scenarios were again stressed out, as this is the desired goal for the success of the endeavour for every party involved. A common agreement around this topic was that in some instances, in order for them to be achieved, there need to be some trade-offs and **key actors might be needed to compromise on those trade-offs for the wider community's prosperity.**

For the Traffic Management, this has been discussed in chapter 3. For MaaS and the MaaS User the benefits to achieve a positive business case are not in the first instance obvious. The MaaS User must be considered as a vital part of the holistic transport chain as he/she creates and adds value on the services he/she consumes. A service non-consumable by most users has no point of existence. **Therefore, there needs to be a trade-off between all the key elements of a Multimodal Mobility Management ecosystem such that each stakeholder understands that they can participate but their results may not be their individual optimum, but from a city-wide perspective the combination of the collective will have the effect of increasing the effectiveness of all mobility.** In turn each stakeholder may receive ancillary benefits of being better informed or having increased levels of planning and data to provide higher degrees of certainty on the execution of their journeys to specific schedules.

Throughout this increased interoperability and data sharing between stakeholders, it will be necessary for the government centrally or governing bodies distributed to take actions in this ecosystem. It was suggested in comments made by the participants during the workshop that the governing bodies or local governments must take an arbitration perspective to provide the necessary control and regulation policies to ensure holistic optimization and demonstrate an agnostic approach to mobility management in order not to appear to favour one mode over another. In this way MaaS can benefit, since an agnostic governing body can use the MaaS Ecosystem to ensure equity is delivered to all residents and commercial enterprises operating in the region.

It is imperative from the outset of these discussions for better connectivity and interoperability between TM and MaaS ecosystems taking into consideration that each city and region is different, with differing goals and policy objectives. In understanding this we will realize that not one common business model can apply in each situation and the framework of a business model will need reviewing for each specific instance. One way forward may be to analyse from the different perspective of each key stakeholder according to the different business models in place and then look at the local/regional government regulation as a mean to achieve the desired model.

4.2. Mobility as a Service operations in the context of Traffic Management scheme

The ability to create an interoperable system where data from the MaaS and the Traffic Management ecosystems can be shared is the underpinning vision of this task force. There are however several issues pertaining to data and collaboration that need examination and rationalization before the success of any interoperability can be realized.

Subchapter 2.4 has previously identified and listed the common data elements that can be provided by a MaaS Ecosystem to the Multimodal Mobility Management systems.

The **lack of standardization** across the various communities makes communication difficult and creates different kinds of data flows. National Access Points (NAPs) may contribute on the solution of such problems defining certain types of data categories and render them accessible by all interested parties. However, governments need to be cognizant that many of the private mobility service providers are global operators and as such the cost of re-configuring data streams to fit with new local or regional data standards can be a market blocker.

There are several unanswered questions in relation to data standards and management that the task force will need to consider these questions come down to:

1. How can we or should we develop a common and open data sharing framework? With this development do we need to address the roles of the key stakeholders and methodologies of cooperation? What becomes the role of the public authorities?
2. Which stakeholder should provide the right information to the right people in the right time? The concept of a Single-Authoritative-Source of a data element during the lifecycle of that piece of data needs to be fully understood to ensure who has the responsibility for creation, management and dissemination at the right time in the data lifecycle.
3. Common understanding of data ownership and management is needed. Access to data does not predicate ownership and as such does data shared between the MaaS and Traffic Management ecosystems become open data that can be re-sold? Stakeholders need to understand that they may not have the right to request access to all data, but just to the subset of data that can be of use for their specific function.

Understanding these issues will be critical to achieve better interoperability and will serve as a launchpad for how MaaS stakeholders can provide better inputs into the Multimodal Mobility Management ecosystem.

The European Union is moving the discussion on frameworks forward focusing on the legal framework for data-sharing in transport (all modes, all networks) that is already in place with

architectures in the ITS directive. MMTIS indicates the specific standards mode by mode, and these should be available soon on the National Access Points.

Finally, when discussing data, the final key issue will be Quality. The analysis from the workshop showed that there needs to be a minimum quality embedded in any data standards.

4.3. What are the impacts and changes needed on Mobility as a Service?

Typically, a stakeholder's role and operational framework within a MaaS Ecosystem will depend on the level of achievable interoperability with Traffic Management operations. The impact of the Traffic Management ecosystem on the operational framework of MaaS stakeholders relies on this achievable interoperability level.

From a private mobility service provider or MaaS Operator perspective the understanding that local policy implementations and control and regulations over operations on a geographic and temporal nature may mean that they cannot offer specific services to their consumers at certain times. For example, in order to reduce overall regional congestion, local coordination between traffic management and the MaaS ecosystem may lead to the local policies implementation that will reduce the number of single use vehicles operating into a region at a specific time.

This implementation of policy is a positive example of nudging user behaviours that can be simply based on implementation of a single policy that restricts, or could be more complex using financial incentives to change behaviours. For example, the parking costs for a private vehicle parked in the central business district can be used to offset someone's public transport trip to make that more of an attractive offer, or to pay someone to work from home.

MaaS stakeholders need to start addressing these issues and not consider these as implied restrictions but as a chance to offer their customers the benefits of functional and quality services adding value to their everyday mobility. A good mobility service should not only consider time and money, but can also be comfortable, accurate and accessible to new customers. In this way a user may not be driven by the speed of a journey, but by more implicit factors such as the improved accuracy of the estimated time of arrival, the perceived comfort of the journey and the environmental footprint.

The financial implications for the MaaS ecosystem need to be considered as well. Cities and public agencies are often budgetary constrained and risk averse to investment, whereas private mobility stakeholders are more inclined to invest in order to get a quicker and larger reward and therefore accept the higher risk of negative return. This mismatch between viewpoints can be exacerbated and the MaaS Stakeholders need to be aware that by participating in better data collaboration and sharing between stakeholders that they may open themselves up to more stringent policy implications that can impact on business.

At the heart of this collaboration between Traffic Management and MaaS ecosystems lies the opportunity to create a huge repository of operational data pertaining to how the transportation network of a city really operates, and then the ability to control that network to the benefit of the city and the users. This powerful resource will obviously be comparable to some of the insights data that commercial companies have created and derive value from now, and monetization strategies to derive value to self-invest into the ecosystem can be generated from this collaboration.

5. Multimodal Mobility Management as a result of Traffic Management and Mobility as a Service collaboration

5.1. Reflections on the basic concept: MaaS & Traffic Management by the workshop participants

During the workshop over 60% of participants strongly believed a collaborative eco-system which includes both Public Transport operators, private mobility operators of emerging mobility service providers, MaaS schemes and Traffic Management will contribute to effective and sustainable mobility.

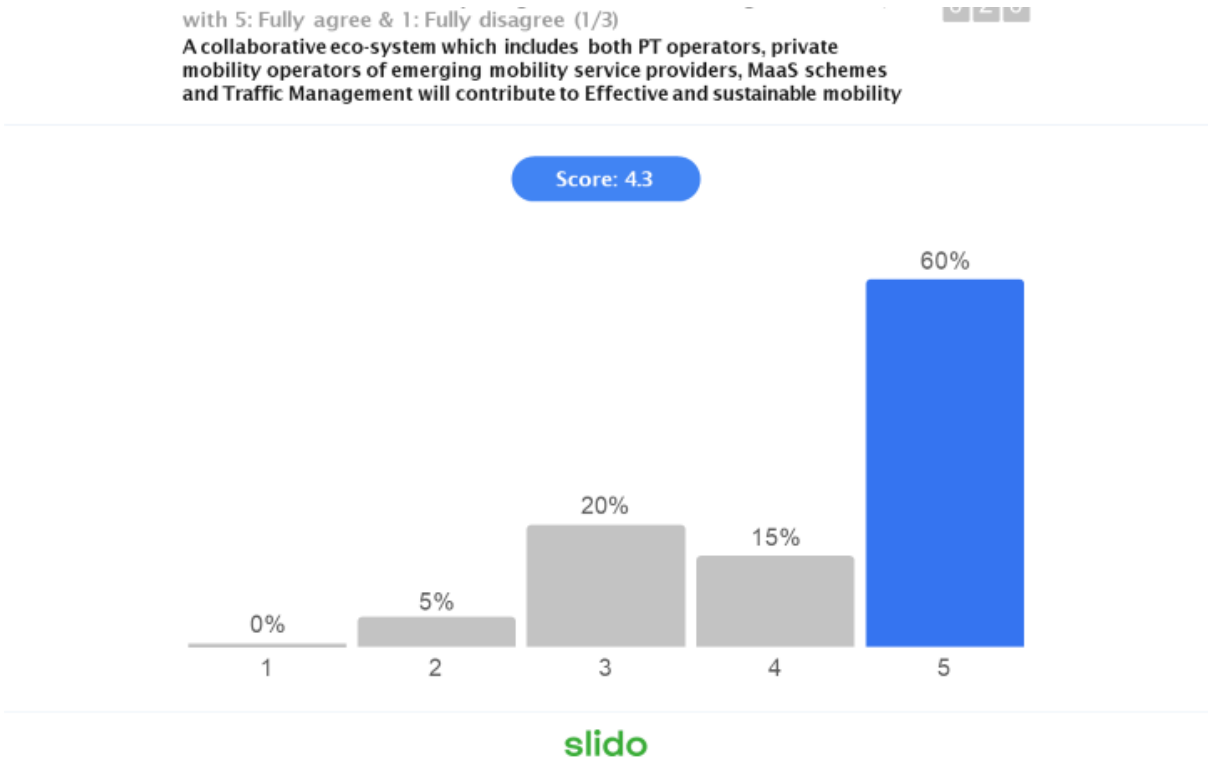

Figure 5: Collaborative Eco-system Agreement

Key goal therefore, should be to put Traffic Management systems and MaaS applications in working together, within a new, interoperable framework for the same Urban area, in which:

1. Traffic Management operations as-is will migrate to Multimodal Mobility management
2. MaaS applications can become integral part of a Multimodal Mobility Management scheme.

The result of such an interoperable framework would be to enhance the impact of both TM and MaaS towards Multimodal Mobility Management versus individual operations. More particularly, MaaS applications could become key channel to deliver TM strategies to the public and TM and vice versa TM services may be an important add on to the MaaS suite of services

The following diagrams from the Workshop's poll reflect the audience's positive opinion:

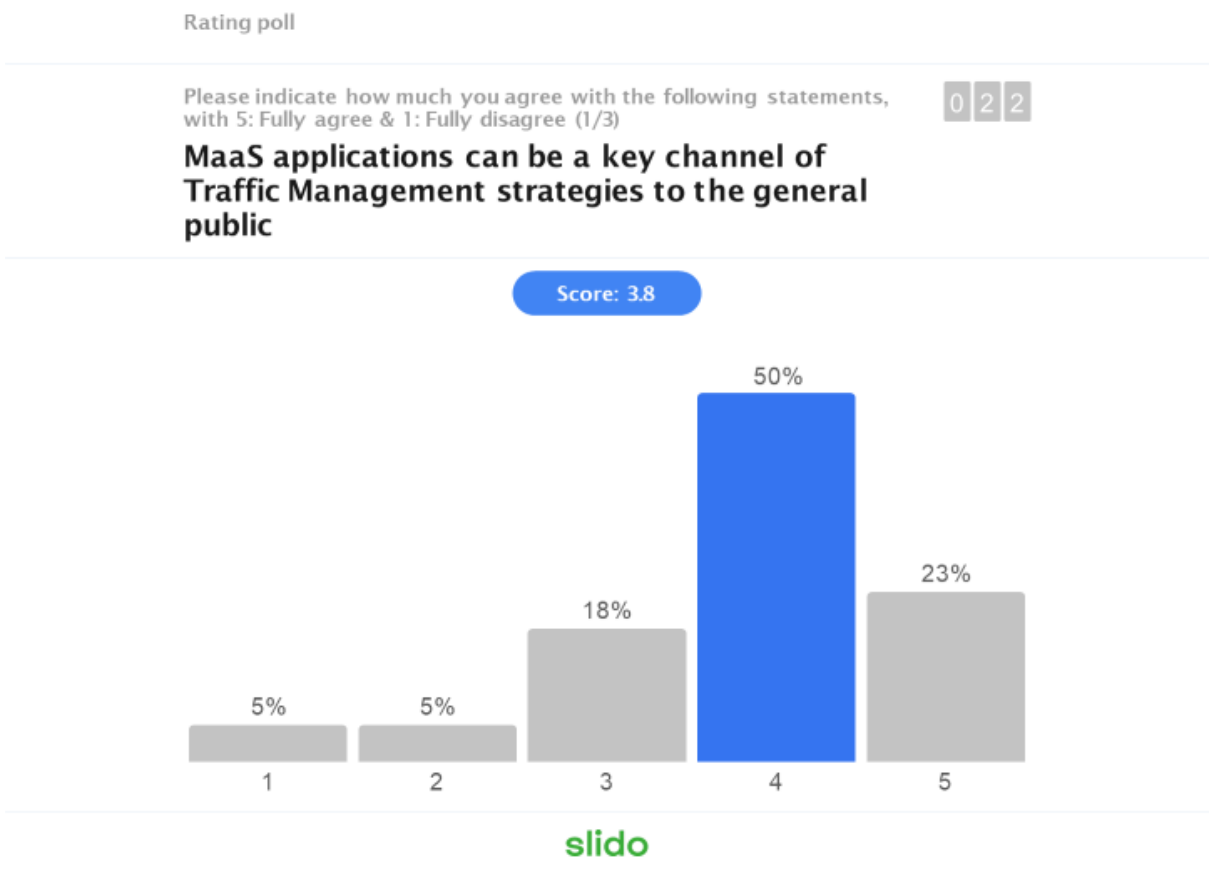

Figure 6: Workshop's audience opinion on the impact MaaS may have on TM

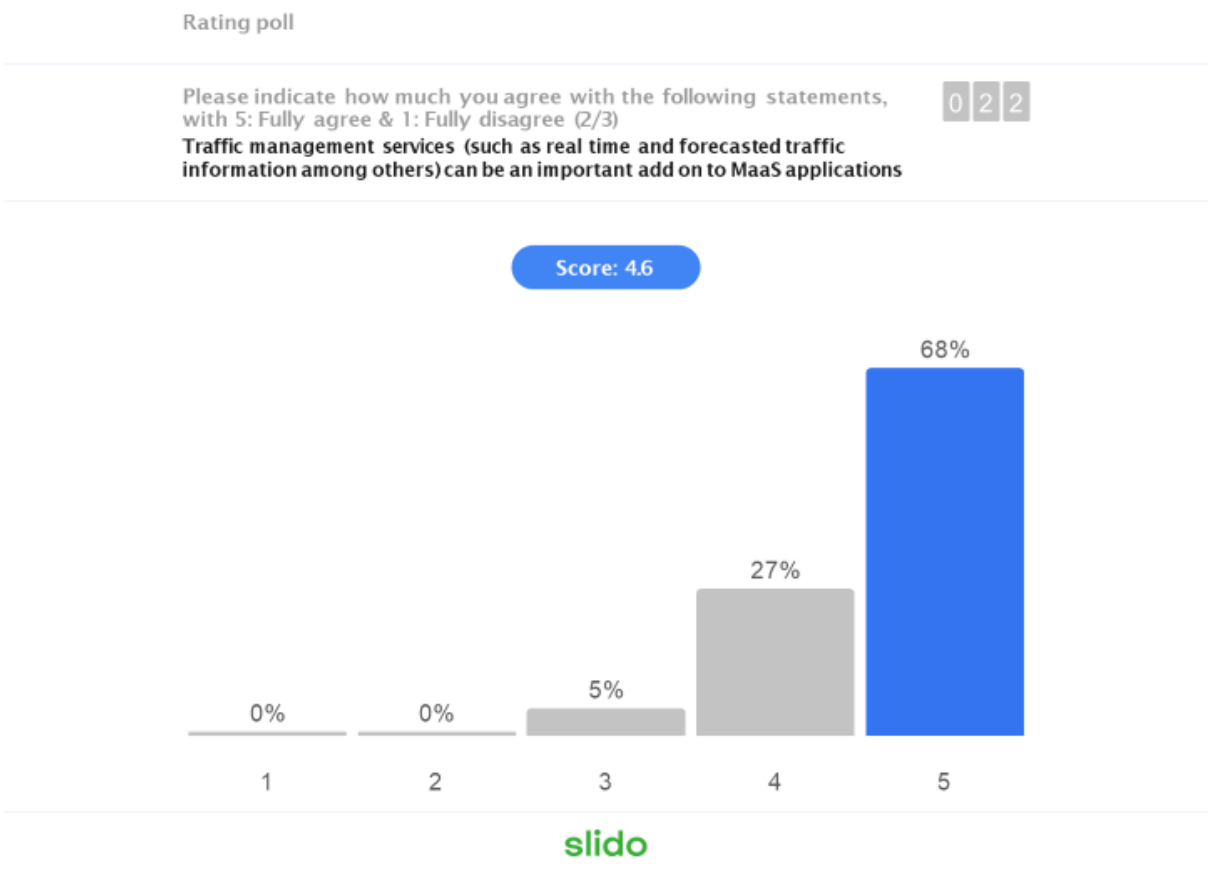

Figure 7: Workshop's audience opinion on the impact TM may have on MaaS

The audience considered as most important TM services to MaaS applications the following (in order of importance):

1. Congestion charging and zone access control areas
2. Traffic status and event detection
3. Advanced navigation services
4. Adaptive and dynamic traffic control

5.2. Drivers and barriers

The cooperation between TM and MaaS concepts demands great effort by all relevant stakeholders involved and as a result, ***concrete business partnerships*** to embrace the impacts and benefits given the existing functional framework, the current available fleets and knowledge. For a successful implementation, valuable key stakeholders need to be engaged, especially MaaS operators, traffic management authorities, local governments, but also the central government, public transport authorities, traffic service providers, public transport operators, and private mobility operators.

TM 2.0 and MaaS should initially focus on ***common data/information exchange framework*** between traffic management and Mobility as a Service towards an integrated operational scheme. European Commission is currently considering a European common data space where mobility data will also be included.

Currently, the Socrates 2.0 project, a pan-European project that brings together road authorities, service providers and car manufacturers, is looking into impacts commonly agreed by public and private organizations to have a trigger into business models. Collaboration between the public and the private sector has been proven to be difficult to achieve due to bureaucratic issues and conflicting interests. **This challenge has to be taken seriously into account despite the view that this innovative approach can reach a system optimum** (in terms of supply vs demand) by the public authorities.

As described previously the efforts on developing a Multimodal mobility management scheme, integrating MaaS and Traffic Management dynamics, needs address parameters beyond just saving money or time on trips, but furtherly offers comfort and ease of use to people. A set of functionally and organizationally network KPIs need to be developed to measure the impacts of the included concepts. KPIs should be considered from different points of view and derive by taking into consideration the whole ecosystem. The additional policies required must provide priorities so as to balance decisions that can benefit different players. The focus of this initiative should be on congestion and flows of different transport modes (private cars, public transport, ride-hailing and taxis, shared cars, bikes, micromobility vehicles, walking etc). Actions need to be performed also for the connection points (being vital points for the transition between different means) between all modes being them parking space, stations or more generally the curb to free spaces on the city centres rendering mobility more accessible and providing reasons and conditions for people to move. Impact driven business models are expected to play a great role on the innovative perception of multimodality with win-win-win scenarios for the public sector (operators, municipalities, governments etc), private operators and users.

The main drivers for participation in the development of multimodal management operations are the improvement of services and planning offered by parties through the novel platform, with knowledge over the whole in infrastructure and the existing services operations empowered by real-time information provided to the users and the immediate reactions in case of a disruption. A better understanding of users' needs in transportation could also extract the hidden demand for multimodal services that is currently not renouncing. Furthermore, the multimodal mobility management platforms can support the dynamics of entrepreneurship and innovation by providing the chance for third parties businesses in applications development or analytics. Smart mechanisms that facilitate the automatization of data collection and processing can also be reused support algorithms targeting to the automatization of human mobility in general and ease the transition to autonomous vehicles.

Common barriers to sustainable cooperation of entities involved in the concept could be divided in three major categories.

1. Perceptions of risk
2. Quality matters
3. Security and privacy

As far as perceptions of risk are concerned usually strategic partners' unwillingness to share data and contribute on the development rests on a set of perceived risks related to a) losing customer relationships, b) cannibalization and c) existing brands.

Existing traffic management and mobility operators pride themselves in being customer-facing organizations with close ties to their own customer base, and in having strong brands. So the opportunity of a third-party bundling and repackaging their services as offers leads them in fear of losing control over their customer relationships and thereby their data and insights on customer behaviour. Existing providers often see demand-side data as a source of competitiveness and a safeguard against cannibalisation and thus maintain a hesitant stance in sharing them into collaborative schemes. Last comes the fear of sensitiveness over the business data that may be put at risk through the sharing process.

Traditional transport related data seem to be insufficient for the materialization of the Multimodal mobility management platforms. The creation of novel services without pre-defined datasets to support the relevant data flows have high risks of failure. Therefore, the consolidation of collected data from multiple business operations into data flows that support the context of Multimodal Mobility Management, and vice versa, requires new methods for collection, translation and adaptation to target and ensure the minimum data quality prerequisites for seamless service functionality.

The incompletes (with some attributes missing, or due to irrelevant datasets) or the incompatibility (with different parameters and variables, different timeframes, etc.) of data might require either major efforts from the side of Multimodal platforms to develop mechanisms and consolidate them over a novel data model, of might require efforts from the side of data providers to adapt their APIs over a common lexicon.

Data security and privacy are in general matters that require sophisticated management and governance practices. Most of the times it's not enough to just comply with the existing legislation. Participating organisations must create future-proof detailed policies on what types of data will be collected/shared and stored/retrieved, and how they will be used. All the existing customer bases need to be informed on the key issues on information sharing within the context of multimodality. Intellectual property rights need to be properly examined and documented as well.

5.3. User acceptance and adoption

In any successful system implementation, the user acceptance parameter is critical. This way it is ensured that system requirements do meet business needs and allows for any issues to be identified and fixed or adapted so that the systems improves. User acceptance derives from the user's perception towards the usefulness of the system, and the perceived ease of use. In other words, the user should be in position to understand the added value of the system and be able to utilize it easily. The perceived ease of use, usually, has a casual effect on the perceived usefulness. User acceptance leads to user engagement which measures whether users find value in every product or service and is highly correlated with overall profitability. To improve MaaS and traffic management user engagement towards the way of multimodal mobility management, some essential user requirements joint with users' actions focused on user experience must be taken into account.

The ultimate goal of multimodality in general, is to offer the best value proposition, providing an alternative to private car use, with a strong focus in fulfilling societal goals. Those goals that need to be taken into consideration upon building the user requirements include:

- Provision of mobility as a basic prerequisite for social and economic participation and interaction; accessibility
- Healthy lifestyle
- Environmental awareness & impact
- Adaptation to demographic changes, migration and other shifts in society
- Service offering in suburban or rural areas
- Advancement of circular economy
- Use of data for public interest, in a human-centric manner
- Lower prices as compared to owning a car (parking, insurance, fuel, etc.)

To improve user engagement and boost user acceptance towards the proposed unified model for mobility, the end user needs to understand the added value and the changes that these services will bring to their everyday lives. The end users typically are aware of the importance to have good-quality traffic information in order to plan and adjust their routes. A smart traffic management system can deal with new situations concerning safety, traffic congestion, obstacles or modal integration, dynamically, by linking all sources of data to produce valuable information for transport users and operators. The most successful ITS traffic management projects and systems are those that are focused on delivering those relevant services and information to individual end users.

However, urban areas are often too small on their own to use ITS services to their optimum effect. Most trips do not stop at historically defined city or administrative boundaries. From the user perspective the whole transportation network is considered as one entity. The key issue for the desired continuity of ITS-services is interoperability.

Individual travellers, whether using private or public transport, almost invariably carry electronic devices, which can act as a medium to convey real time traveller information. Feeding real time traffic information to drivers' navigation devices and public transport users' smartphones is a prime example of a potentially readily available means of communication with individual travellers. This information that is conveyed to individuals aids also the overall management of the network. The challenge for providers is to provide bespoke information to individuals, which also considers the way the network operates.

Transport modes are generally not equal. There are ways to travel inside a city that are more comfortable, faster or more luxurious compared with others. Usually they are also of higher cost as well. However, MaaS users can combine transport modes in the context of multimodality and find the best set that satisfies their needs. The MaaS Alliance has identified several factors within the "MaaS User Experience Matrix", affecting the user experience, and setting a starting point towards the user requirements leading in user engagement, acceptance and adoption. Four generic categories have been identified. Below we present briefly the categories that are in depth discussed in MaaS Alliance's position paper.

- **Safety and security of services**
    - Handling of personal data
    - Data security
    - Safety during the journey
- **Convenience**

- Contracts and plans (Clear information about MaaS offerings, Transparency in pricing, clear information about the service promise)
- Seamless transit experience
- Flexibility
- Accurate display of the travel options (Cost, time, number of changes, information about environmental impact)

- **Inclusivity**
  - Ensure inclusive services (No local phone number or credit card requirements)
  - Accessibility i.e. non-discriminatory access of all user groups
  - Information related to environmental and health benefits
- **Customer Support**
  - Real-time assistance and customer care (online/offline)
  - Liabilities
  - Customer protection in event of insolvency of service provider

From the previous, we distinguish the accessibility and inclusivity aspects that need to be taken into consideration seriously. People with special needs, children (students) and the elder, is essential to have equal access to all the multimodal services offered. Multimodal mobility management has to take this portion of people into consideration helping them reduce the mobility difficulties they are currently having. In other words, Multimodal mobility management should prioritize space in city centers for primarily for walking over micromobility, also for bikes, over cars and for public transport over shared services. Beyond the flows and mobility, focus needs to be drawn on generally in space and reasons/conditions for people to move. People are the key to sustainable business over transport and the novel platforms should focus on people rather than vehicles and provide valuable information to gain users' commitment and provide them with reasons to choose multimodality over private car ownership. By taking into consideration the current users' response to MaaS and traffic management services, it is extremely possible that the combination of the two concepts unlocking the full potential and their integration into a novel system, will bring even greater user engagement and adoption.

Wrapping up, integrating from the one side the flows of real time traffic information, traffic status, events detection etc. on handheld electronic devices such as smartphones, and from the other the ultimate dynamics of MaaS with the proper personalized mobility combinations we end up with the **new revolutionary concept of multimodal mobility management and offer to the users the absolute degree of freedom in choosing their favourite ways of comfortable transportation with exceptional time accuracy and reduced costs compared to car ownership.**

In open forum during the collection of the workshop attendees' responses there were several comments as to the lack of shared vision between the key stakeholders and the ability to understand other users' needs and preferences, let alone the communicating the benefits to other users that may be seeing a penalty in their operations. The differing business objectives by different stakeholders, especially between private-to-private and private-to-public, are issues that need to be overcome to have a successful integration of MaaS and TM platforms.

6. Outlining the Multimodal Mobility Management Business model/case

Multimodal mobility management as a conceptual solution to unify multimodal mobility schemes with embedded traffic management services has yet to mature. Certain issues regarding data, such as ownership, rapid technological advancements, a lack of a unified lexicon, combined with lack of cooperation between key stakeholders and uncertain cashflows might require a cultural transition from the classic built-in-house solutions to more collaborative, agile and lean models of services' development. IT solutions providers and traditional public or private transport operators and traffic managers need to overcome fears, battle operational obstacles, and seize innovation opportunities to design the future of mobility, where people will be able to enjoy the urban transportation freedom. The basic objective of this chapter is to initiate an effort towards the materialization of the concept, by shedding light on a business model process that could be eventually expanded and adapted accordingly to fit the overall solution.

6.1. Business Architecture

When discussing business models for collaboration between the ecosystems, 70% of the workshop attendees said that Win-Win-Win Business models are important for successful cooperation.

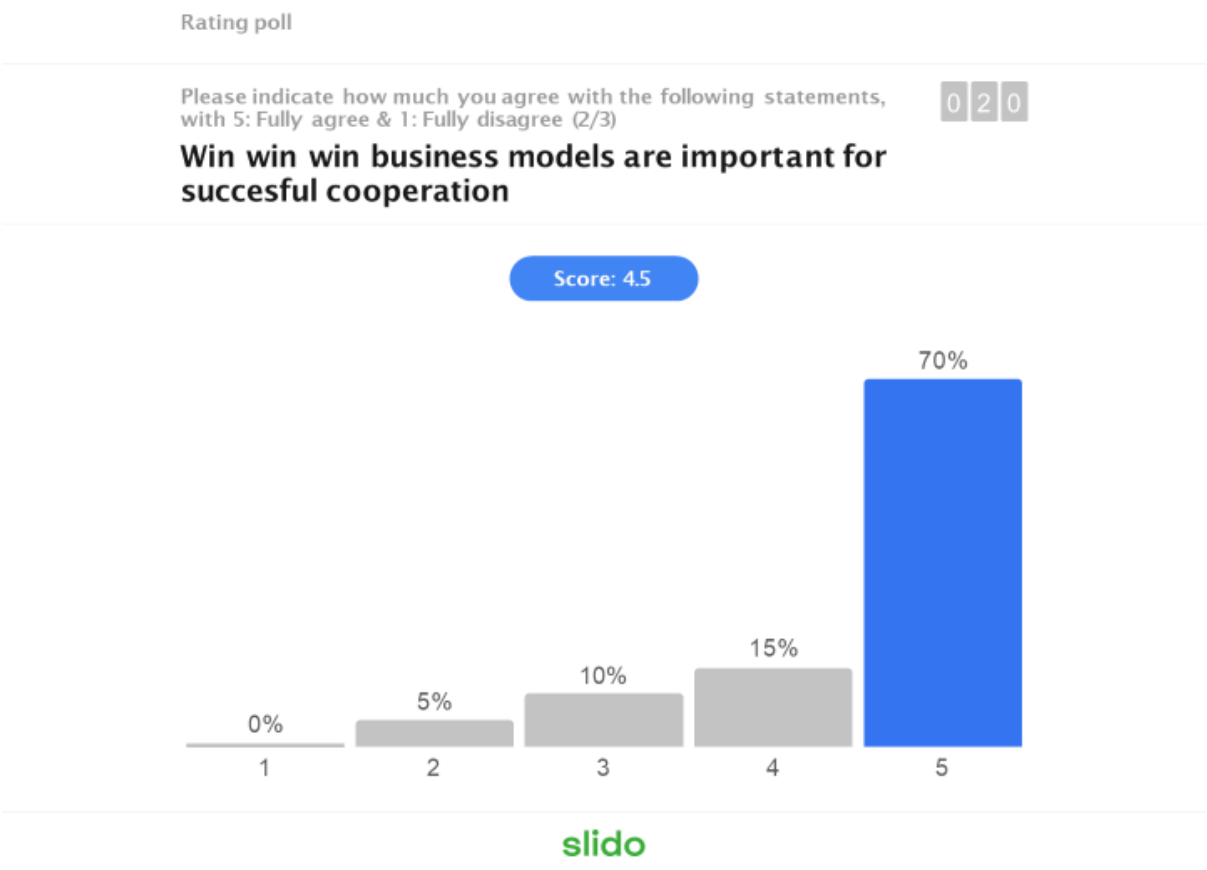

Figure 8: Workshop's audience opinion on the role of business models for the success of cooperation between MaaS and TM

As defined in the conclusions of the TM2.0 Mobility as a Service Task Force, the individual stakeholders may have a specific business value in the market, but when they interact and collaborate together within a new and interoperable business "Ecosystem", they develop a group dynamic, which is then transformed into added value for the entire Eco-system. There are two

Ecosystems relevant in the context of this report, namely, the TM2.0 and the MaaS. The two together form a super-total, which is the TM2.0-MaaS Business Ecosystem.

The TM2.0-MaaS Business Ecosystem has the Actor: User, in the middle of the attention, being the consumer of all information and services.

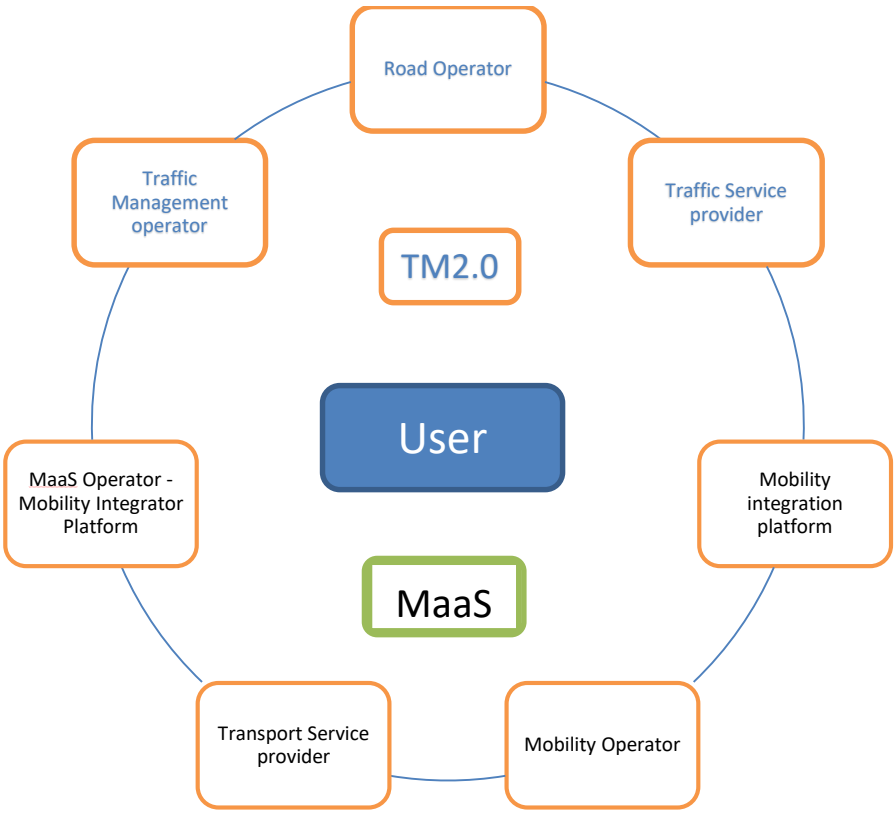

Figure 9: TM2.0 & MaaS Stakeholders; basic view

It was identified by the workshop attendees that they consider the top three stakeholders for the necessary integration between MaaS and TM2.0 are the MaaS Operators, the Traffic Management Authority and Local Governments.

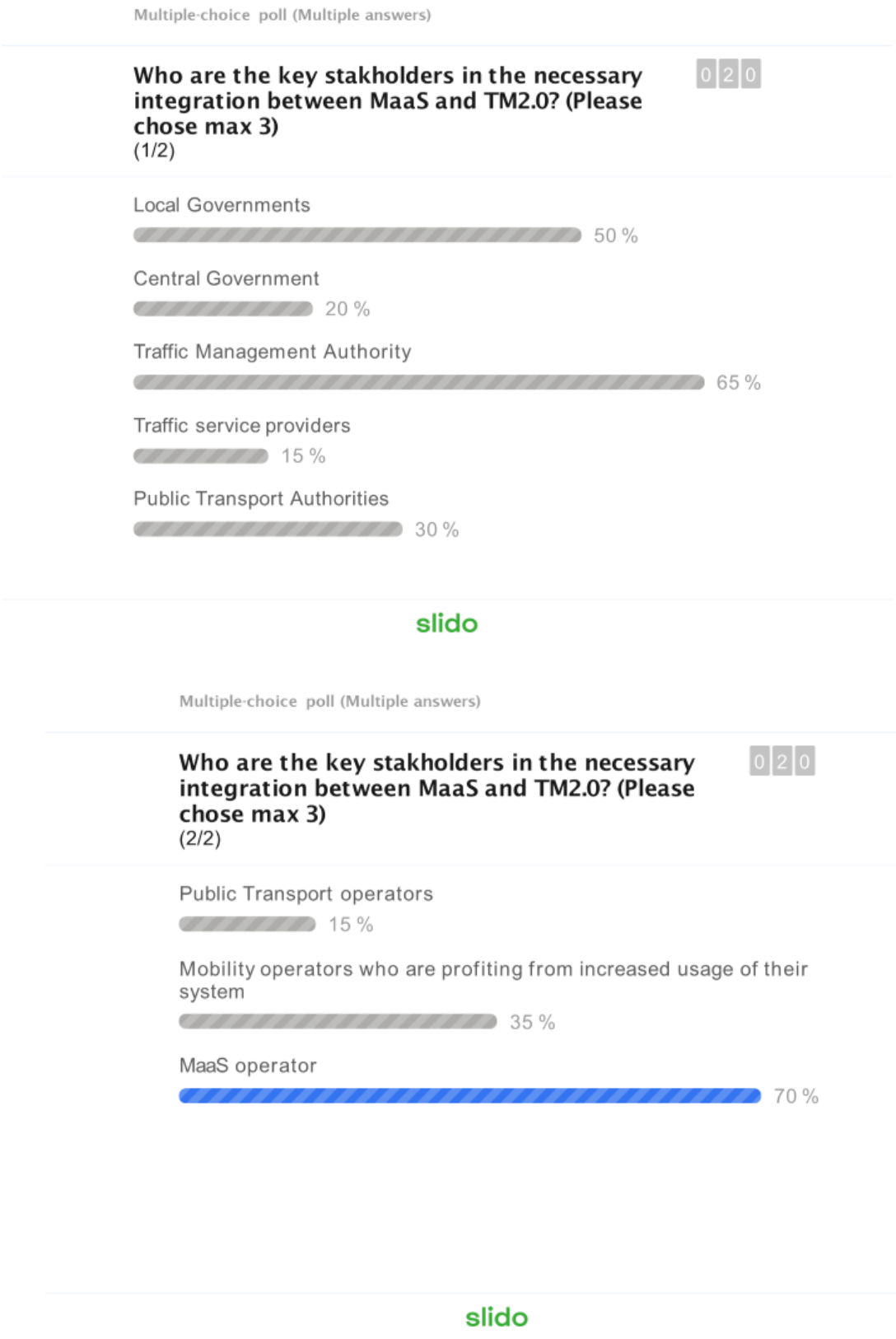

Figure 10: Workshop's audience opinion on key stakeholders in the context of MaaS and TM integration

As a conclusion in order to achieve the main goal of interoperability between MaaS and TM, there should be two key objectives as a basis for any future business structure (i.e. business architecture) planning:

1. The collaboration between public entities (for example: TM agency, PT Operators, city administration) as wellas between public and private stakeholders should be based on clear business rules for data sharing, responsibilities and end user contacting, which should be facilitated by governance model and knowledge management tools
2. The end user engagement is essential for the market success

The above-mentioned issues are handled in the following sections, by analysing the drivers and benefits per stakeholder as well as the end user incentivization strategies.

6.2. Drivers and Benefits per stakeholder

To this point it is very clear that the novel multimodal mobility management concept will come to cover the gap between traditional traffic management and multimodal transportation offering, typically through MaaS, by creating innovative mechanisms to achieve the intended strategic goals.

The involvement of previously identified stakeholders plays a vital role since the success of the initiative heavily depends on the number of consisting bodies around it and the level of participation. There are many drivers and benefits for each and every stakeholder upon joining this new form of alliance and part of the workshop was dedicated in discovering them.

At the level of national and local public administration, the central/national government as well as the local governments will benefit from their participation in the initiative, according to the experts, fulfilling part of their strategic goals and strategic planning, by participating in the efforts to reduce traffic congestions. Regarding green policies, they will help to reduce the environmental impact of car ownership for citizens. Especially at the levels of municipalities and regions there can also be financial benefits at the same time, while in parallel they will strengthen entrepreneurship and offer access to new mobility services.

Public Transport operators, being the cornerstone in any multimodal operations and also in MaaS initiatives, will observe and improve fleet optimization therefore more efficient utilization, with the corresponding impact on financial figures. We see that in this case, as well, there are financial benefits for participation. As for the strategies of public transport organizations, their main goal is to contribute to the reduction of traffic congestions and it seems that by participating in such schemes they will achieve this to a greater extent.

The traffic management authorities being responsible for traffic management strategies on the road network in addition to being able to have more diverse and a larger volume of information available to achieve the implementation of global preventive response strategies, so as to ensure a safer and more efficient use of the road network, will be able to be even more effective in optimising the existing infrastructure and contribute to achieving their strategic goal of reduced congestions. Regarding their social work and public benefit goals outside of business activities, they will contribute with their improved actions to the reduction of the environmental impact through the reduction of moving vehicles in the road networks.

Traffic service providers' involvement, operations, services and data are very precious on building a multimodal mobility management scheme in collaboration with multimodal transport providers. Until now, on private entity side of traffic management, several stakeholders arise that can provide traffic management data from their services and/or can benefit from using data as provided by

public entities. Similarly, by offering data to the centralized platform in exchange with data provided by multimodal service providers, traffic managers can improve their quality of services and therefore, react more promptly in incidents and emergencies. Their engagement in the multimodal mobility management implementation will also benefit them in expanding their market and as a result breaking the barriers on their business opportunities leading eventually on increased profitability. Similarly, to the traffic management authorities they will also come closer in achieving their strategic goal of reduced congestions.

Multimodal service providers and mobility operators can benefit from sharing/offering the user generated data to a multimodal mobility management platform. This platform, with the combination of traffic managers' data will be in position to offer proper feedback to them, thus adding value to their services. MaaS operators can also pave the way to new business opportunities and new business collaborations with other key players around the road infrastructure. Such actors, since they are profiting from increased usage of their systems, they will be able to enjoy the financial benefits which the increased usage of their platforms will offer them. They will also be able to create more advanced and innovative mobility services or complement their business with increased accessibility to existing. Partnering with Traffic Management Operator can also create competitive advantage for MaaS operators by improving the data and quality of service provided.

Content service providers with higher numbers of active users have a broad and real-time data source for monitoring the status of the road infrastructure and (given the number of trips that are pre-planned), even know where traffic is to be expected. Currently, these service providers provide their navigation based on a combination of their own monitoring and use of publicly provided open data on travel times, congestions, roadwork, etc.

6.3. Incentivization strategies

Multimodal mobility management systems rely mostly on data generated by users. A combination of MaaS users' generated data with traffic data at city level, data originated from connected vehicles and real time situations (etc), will ultimately reflect on the quality of services offered improving their accuracy and efficiency.

To fully unlock the potential of encouraging commuters to use more sustainable transport options and offer their data to the service providers some further incentives strategies might be helpful.

Examples of incentive strategies, which may satisfy both actors, could include but not limited to:

- Promotional and/or push information where the user is pushed information on sustainable mobility alternative choices either at purchase phase or during a trip.
- Financial incentives in means of discounts, discount codes, free rides, taxation exemptions, discounts on added value services etc.
- City-wide loyalty schemes including loyalty points won through use of sustainable mode choices
- Enhancing a socially responsible user profile in which case the user is motivated by getting awareness from the system of his/her socially responsible behaviour. Similarly, the user could be appraised for an active and healthier mobility user profile, for example, by using a bicycle or walking rather than driving car. For more info please consult www.mycorridor.eu and in particular the outcomes of work package 7 on business models, incentives and legal

issues, UITP's Mobility as a Service report (May 2019) as well as EMTA's paper on MaaS (June 2019).

Another important aspect that seems to attract users in digital service provision applications is gamification. Applying game-design elements and game principles in multimodality, or defining a set of activities and processes to provide mobility solutions by using or applying the characteristics of game elements is believed to improve user engagement, ease of use, usefulness of systems and crowdsourcing. In principle, gamification techniques are intended to leverage people's natural desires for socializing, mastery, competition, achievement, self-expression, or simply their response to the framing of a situation as game or play in a form of addictiveness. Some game design elements that can be included on multimodal applications include:

- Point system
- Badges
- Performance graphs
- Avatars
- Teammates

Loyalty programs/schemes seems also to have a positive impact on user engagement as marketing strategies entirely designed to encourage users continue using services. Such schemes usually include rewards or points cards, as a means of recognition of their good travel behaviour, green transport choices/CO2 equivalent saving, and reduction of traffic congestion, either physical or digital with barcodes identifying the card holder as a participant in the program. Participants typically receive either a discount on their current purchase, or an allotment of points that they can use for future purchases. This way the card issuer uses aggregate data internally (and sometimes externally in case of sharing on the context of multimodal mobility management) as part of marketing research. Entirely offering free services is not necessarily the solution because users might not be able to find the added value of those that are good for the city (e.g. free park and ride + free shuttle to the city centre). On the opposite, rewarding users for their purchased services through the loyalty schemes triggers them into exploring further the world of multimodal mobility.

Bonus types offerings and loyalty schemes have been proved also to render the application usage addictive, therefore they could also stimulate sustainable travel behaviour as well rewarding shared or eco-friendly modes of transport. However, all the rewarding system should be studied carefully by experts as different segments may respond to different types of rewards. A free or a discounted travel could be a result of certain same travel purchases (in a personalized way). A discount on a partner service could also be considered as a result of travels made in a certain timeframe, adopting the frequent travellers' logic mostly utilized by airline operators.

Boosting user adoption can also derive though user participation and involvement in the system implementation or on its maintenance and extension phase. User involvement, as end users are in fact stakeholders on the systems, is ensuring that the voices of users are heard and they are able to actively shape and/or improve the services they use and influence the policies around them. Using kinds of those techniques the users' interest gets motivated and they have the feeling that they are actively involved in the construction of something of their own according to their needs. The system can be partially personalized after identifying the market gaps through those actions and build solutions to cover them. Completing questionnaires, participating in focus groups (as a possible

reward for loyalty) or by receiving feedback from proper forms for suggestions or corrections, as ways of participation and involvement increases active users' engagement and can attract a larger audience.

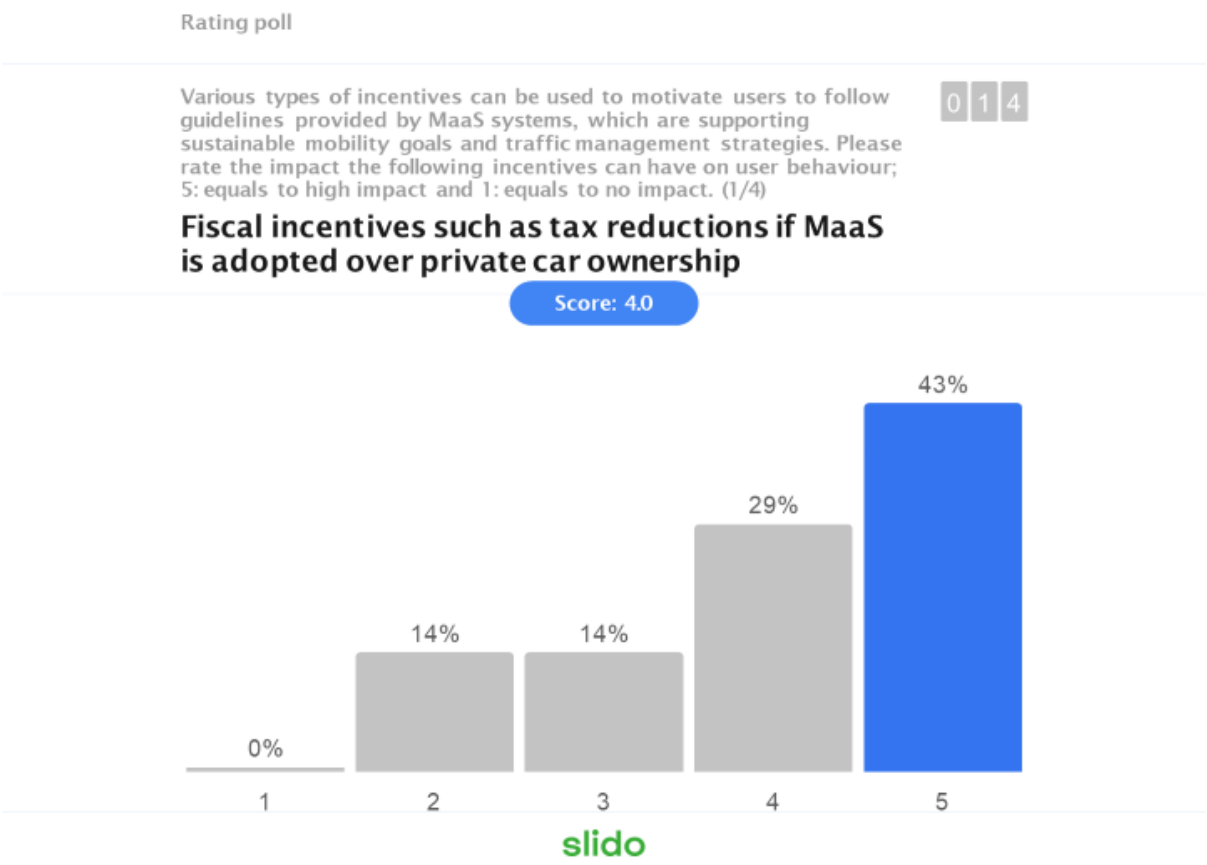

Figure 11: Workshop's audience opinion on fiscal incentives to motivate users in following MaaS guidelines

On the workshop's open discussion on incentivization to motivate users to follow guidelines provided by MaaS systems, which are supporting sustainable mobility goals and traffic management strategies, 75% of the respondents either agreed or fully agreed that fiscal incentives such as tax reductions would incentivize people to adopt MaaS over a private vehicle, while 93% of the respondents agreed or fully agreed that economic incentives such as discounts for making a modal shift would have an impact on achieving the overall mobility goals and traffic management strategies.

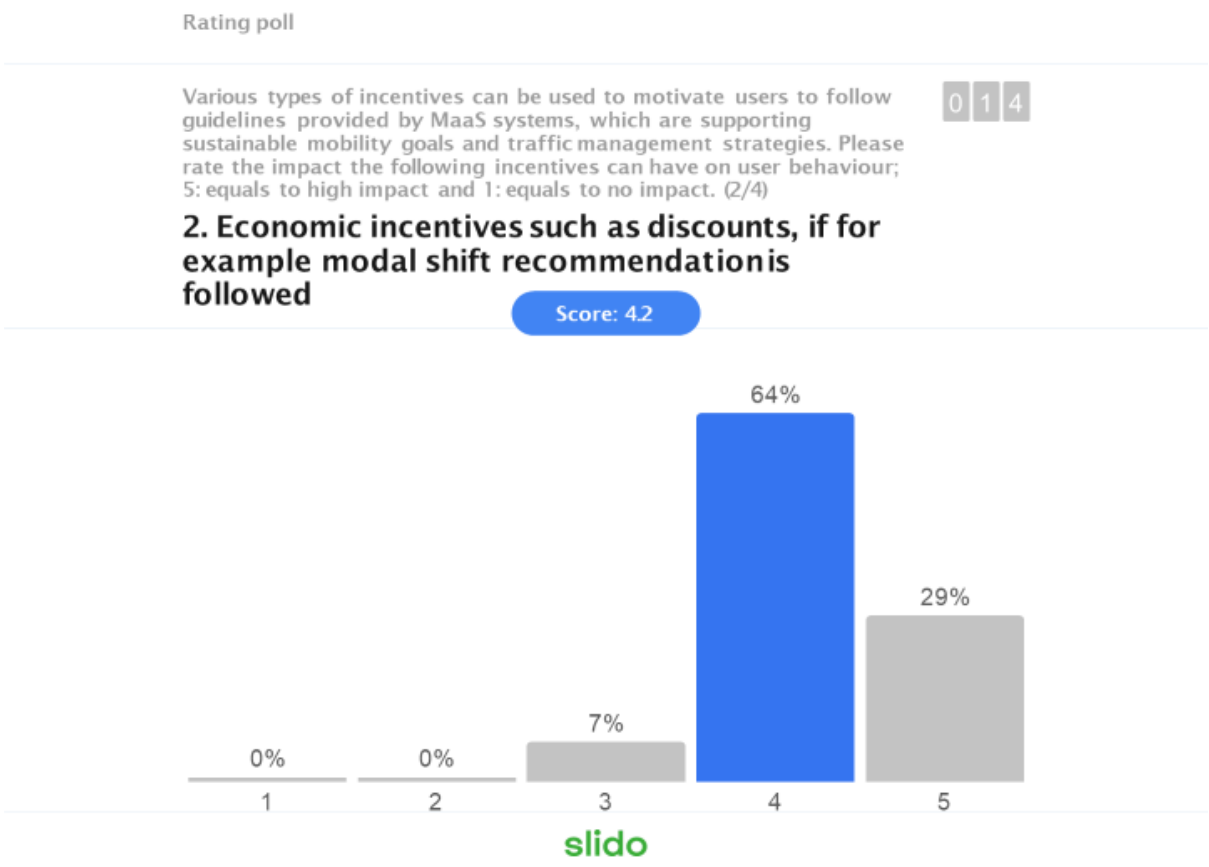

Figure 12: Workshop's audience opinion on economic incentives to motivate users in following MaaS guidelines

The questions pertaining to loyalty points for incentivization and moral rewards to nudge behaviour showed little support and consensus showing that fiscal rewards appear to be the most favourable methodology for nudging and incentivizing behaviours.

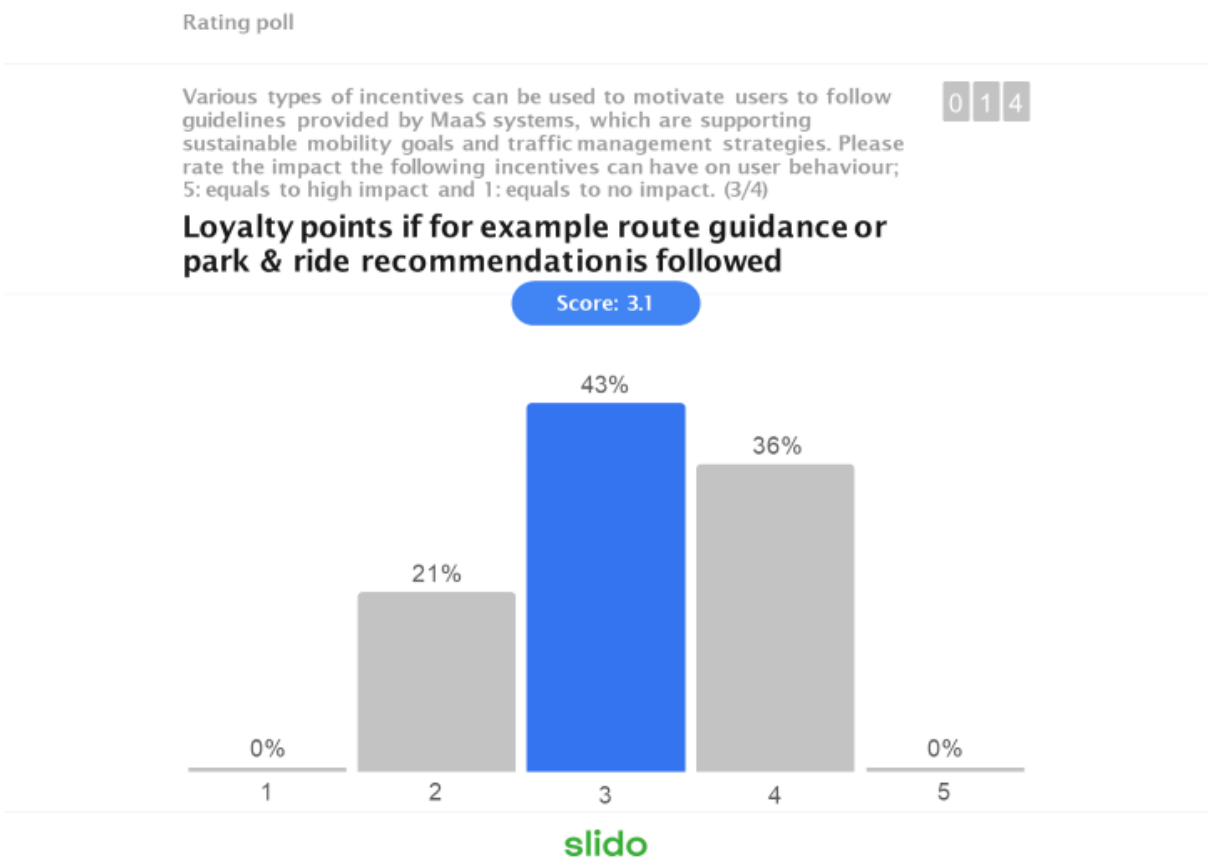

Figure 13: Workshop's audience opinion on loyalty points as a means to motivate users in following MaaS guidelines

Concluding, the incentivization strategies are believed to benefit in an overall sustainable mobility. According to the experts those who should be burdened with the costs of those incentives are in principle the central and local governments while also users are expected to contribute as well through their engagement and the subscriptions. Mobility operators and MaaS schemes must also absorb some of the costs of those incentives together with public transport authorities and operators.

Figure 14: Workshop's audience opinion on moral rewards to motivate users in following MaaS guidelines

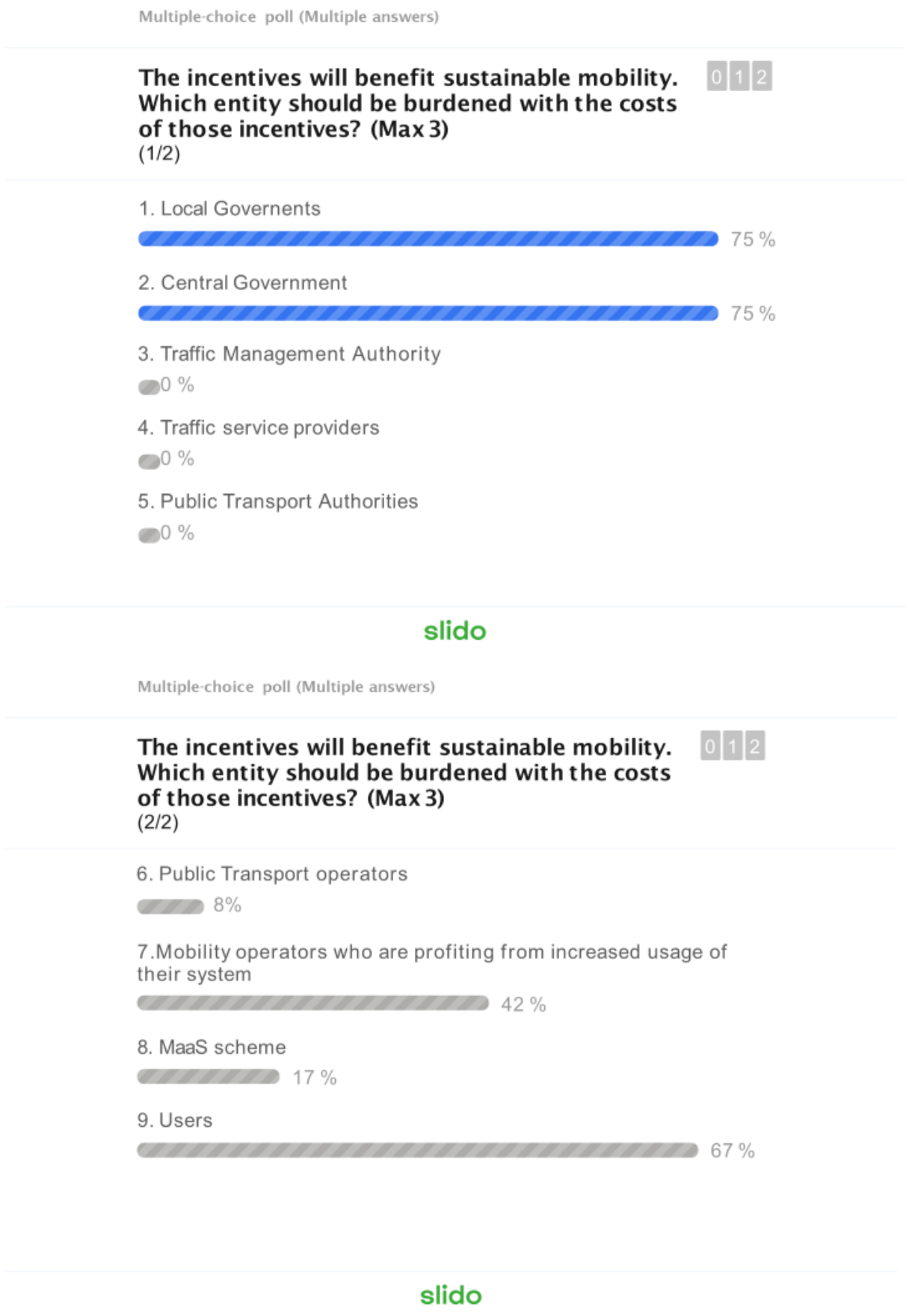

Figure 15: Workshop's audience opinion on entities that should be burdened with the costs of incentives

7. Conclusion

The combination of data flows and diverse existing mechanisms of the Traffic Management and Mobility as a Service ecosystems may ultimately lead to the novel materialization and development of a multimodal mobility system to further optimize the road network efficiency and support the green efforts of cities decarbonisation in the general intelligent transportation system while in parallel decrease the need for private car use and ownership by providing sustainable mobility of humans and goods in urban and peri-urban environments.

Multimodality is the fundamental block for the concept of Mobility as a Service, since the latter heavily depends on combining different transportation modes when a journey is planned and/or performed. With the added support of mechanisms from the Traffic Management systems providing preservation of traffic capacity and improvement of the security, safety and reliability of the overall road transport system, a synergy between the Traffic Management and Mobility as a Service is imperative and necessary for the development of an effective multimodal mobility management system. Members from both alliances can benefit from their dialogue and cooperation towards identifying optimal business cases and collaboration, coordination and interoperability schemes that help everyone attain a win-win-win.

This taskforce was originally initiated by TM2.0 and was strongly supported by MaaS Alliance. The key point of the taskforce's efforts has been to study the ways of evolution from Traffic to Transport and the migration to Total Mobility Management in the urban domain. The ambitions of this transition are decarbonisation, sustainability, multimodality and quality services for the traveller. Such transition is not considered easy to achieve while in some cases experts pointed that it would not even be feasible, as there are different objectives set to be achieved by the various stakeholders and most importantly different jurisdictional responsibilities held by public transportation and traffic authorities which leave little room for cooperative eco-system operations. This is in fact a major issue that needs specific attention if we wish to proceed towards an inclusive, efficient and multi-modal mobility system.

Towards this evolution, impact driven business models are expected to play a major role on the innovative perception of multimodality with win-win-win scenarios for the public sector (operators, municipalities, governments etc.), private operators and users. A set of functionally and organizationally set network KPIs, taking into consideration the whole ecosystem, need to be developed to measure the impacts and benefits beyond time and cost of TM and MaaS. Authorities need to prioritize their goals at city level as policies and politics play a major role. Urban planning may assist the innovative concept and focus on reducing the need for mobility in general by rendering the mobility management less demanding. From the end user perspective, a good service is considered not just saving time and money, but also offer comfort and the capability to use it, as well as accessibility and equity.

One good practice is to offer incentives on the usage of journey planning applications. The satisfaction of multiple and diverse user requirements is of paramount importance for the efficient delivery of new services.

Data, the sharing and management of it will and communication play a major role in this initiative. The concept of having a single authoritative source for a data element through its lifecycle was ultimately considered a viable solution for coordination across stakeholders, but it will require significant analysis per business case from all stakeholders' perspective in order to make this a viable solution. The cost associated with the creation, management, distribution and storage of data, along with the regulatory requirements in terms of data privacy are not to be underestimated. Data should and could be used to make more informed decisions to the benefits of all stakeholders if managed in a mutually agreed data framework. This kind of interoperability will help safeguard all user personal data

With centralized efforts to build the system will be able to provide security with emphasis on privacy. In any case, the protection of personal data and especially the sensitive ones are top priority. The data and information collected and processed can pave the way for new businesses and identify market gaps, provide new offers and ways to attract more customers/users, and even be used for further research across the ITS industry. Interoperability allows an internal computer system to connect with networks of computers that scientists rely on for doing such researches and studies or perform analytics to find solutions to transport problems such as traffic and transport network congestion when each sub-platform is interconnected to others in this interoperable structure, functionalities of each sub-system will be observably improved.

Further to technical interoperability, there should be also actions to enhance the operational interoperability between various stakeholders who do not share the same vision and are unwilling sometimes to cooperate. A first blueprint on a new business approach to achieve this goal is analysed within the report; key driver is to define a win-win business model for which end user the main focus.

Following the initial research carried out in the context of the taskforce addressing multimodal mobility management as a result of component forces from the sides of MaaS and Traffic Management, there are several matters that need to be considered for the design and development of a viable and sustainable user centric business ecosystem. Such a successful ecosystem will be in position to implement a collaborative scheme and build technological solutions towards multimodality.

The two platforms, namely TM2.0 and MaaS Alliance should cooperate in the future in the form of joint Task Forces and initiatives as well as communication with key stakeholders such as public bodies and mobility service providers from both the public and the private sector to achieve their involvement in the common approach towards multimodal mobility management.

Below there are proposed next steps from a common TM2.0 & MaaS Alliance perspective as well as from individual point of view (which however can be implemented through joint activities between the two platforms).

Proposed next steps **common path for both TM2.0 & MaaS Alliance**:

- Business case development (market demand, technological advance, legal requirements, ecological impacts, social need)

- Emphasis on Public bodies involvement and engagement of mobility service providers from both parties platforms
- Stakeholders' expectations and risk thresholds.
- Vision and high level scope definition
- Data related aspects
- Organization and Governance models
- Business model construction
- Funding opportunities
- Consideration of Integration Schemes
- User behaviour

Proposed next steps from the **TM2.0 perspective**:

- Further emphasis, through a new Task Force should be given on Governance of multimodal transport management, taking into account also the public transport operators and local governments opinion and objectives
- Further emphasis, maybe through a new Task Force should be given on User Behaviour; more specifically what could be the incentives and other tools through MaaS applications to influence user behaviour in order to promote traffic management strategies and "soft" measures for intelligent access control
- The intelligent access control Task Force could expand its work by including MaaS as a possible tool to influence User Behaviour
- New more focused Task Forces could be initiated, in the area of emerging mobility services and Traffic Management (possible tools could include car sharing and micro-mobility).

Proposed next steps from the **MaaS Alliance perspective**:

- MaaS Alliance Working Group to review the impact on API development and outlining the schema for traffic management event or restriction data on MaaS Stakeholders
- Development of business case for data interoperability with Traffic Management for the benefit of the stakeholders in the MaaS Ecosystem. Which stakeholders would receive the greatest benefit and how can this be rationalized into a business case that all stakeholders can support.
- Analysis of governance from a MaaS Perspective to evaluate if control of the impacts of traffic management on multi-modal journey planning will have a negative impact on the open ecosystem for MaaS. There is a need to determine who in the MaaS ecosystem would be the managing authority that would provide agnostic controls over the MaaS stakeholders.
- Analysis of the MaaS ecosystem in terms of the impact on user preferences and behaviours, as well as the rights of the user in terms of being controlled or nudged to accept a non-preferential route. Does a city/region have the right to impact on a user's travel preferences?

8. References

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5. Mobility as a service (MaaS) and sustainable urban mobility planning – The Urban Mobility Observatory (September 2019).
6. Ready for MaaS? Easier Mobility for citizens and better data for cities – UITP (May 2019)
7. A perspective on MaaS from Europe's Transport Authorities – EMTA (June 2019)
8. Traffic Management 2.0 – Mobility as a Service Task Force (June 2019) – TM2.0
9. The exchange of traffic management plans in TM 2.0 – 11th ITS European Congress, (June 2016).
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13. What is MaaS? - https://maas-alliance.eu/
14. Minutes of joint TM2.0 and MaaS Alliance workshop held at 19/2/2020 – TM2.0 & MaaS Alliance

Annex - Results of the workshop

TM 2.0 and MaaS Task Force Workshop

19 - 19 Feb 2020

Poll results

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- on user experience must be taken into account. Please rate the seven basic user requirements groups identified based on their importance on a scale from 5: Fully agree & 1: Fully disagree.
- Please provide your take aways from the morning session
- Please indicate how much you agree with the following statements, with 5: Fully agree & 1: Fully disagree
- Who are the key stakholders in the necessary integration between MaaS and TM2.0? (Please chose max 3)
- Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Local Government? (Choose max 2)
- Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Central Government? (Choose max 2)
- Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Traffic Management Authority? (Choose max 2)
- Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this

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- process, what are the key benefits and drivers for Traffic service providers? (Choose max 2)
- Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Public Transport operators? (Choose max 2)
- Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Mobility operators who are profiting from increased usage of their system? (Choose max 2)
- Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for MaaS scheme? (Choose max 2)
- MaaS can become the "tool" to integrate TM operations at neighbouring geographical locations as well as with long haul public transport and Logistic operations. Please rate the influence that MaaS can have in the following scenarios; 5: high influence and 1: no influence.
- Various types of incentives can be used to motivate users to follow guidelines provided by MaaS systems, which are supporting sustainable mobility goals and traffic management strategies. Please rate the impact the following incentives can have on user behaviour; 5: equals to high impact and 1: equals to no impact.

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- What are the technical, business and market barriers for the integration of TM 2.0 & MaaS
- Please provide your take aways from the afternoon session
- The incentives will benefit sustainable mobility. Which entity should be burdened with the costs of those incentives? (Max 3)

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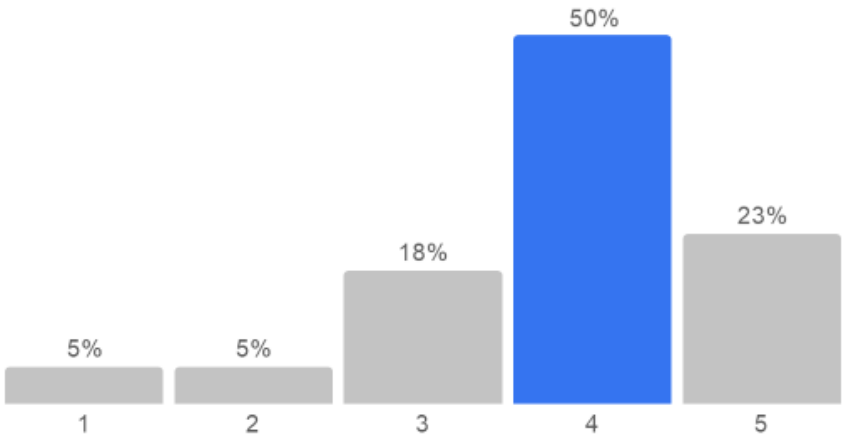
Rating poll

Please indicate how much you agree with the following statements, with 5: Fully agree & 1: Fully disagree (1/3)

0 2 2

MaaS applications can be a key channel of Traffic Management strategies to the general public

Score: 3.8



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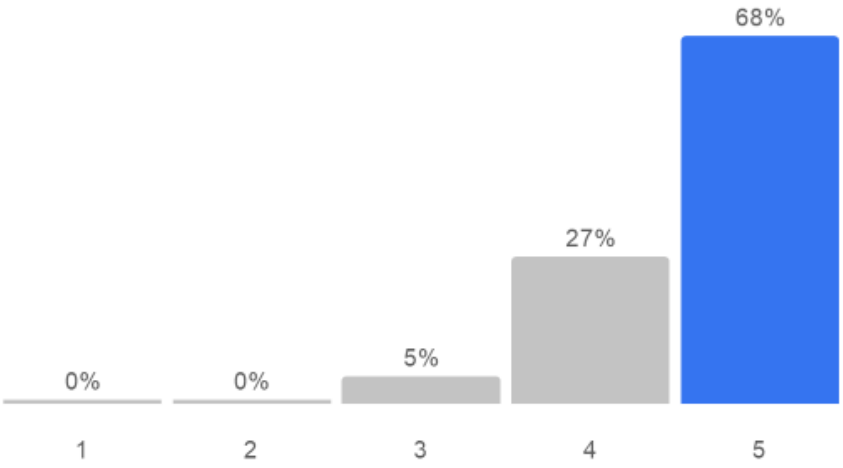
Rating poll

Please indicate how much you agree with the following statements, with 5: Fully agree & 1: Fully disagree (2/3)

0 2 2

Traffic management services (such as real time and forecasted traffic information among others) can be an important add on to MaaS applications

Score: 4.6



slido

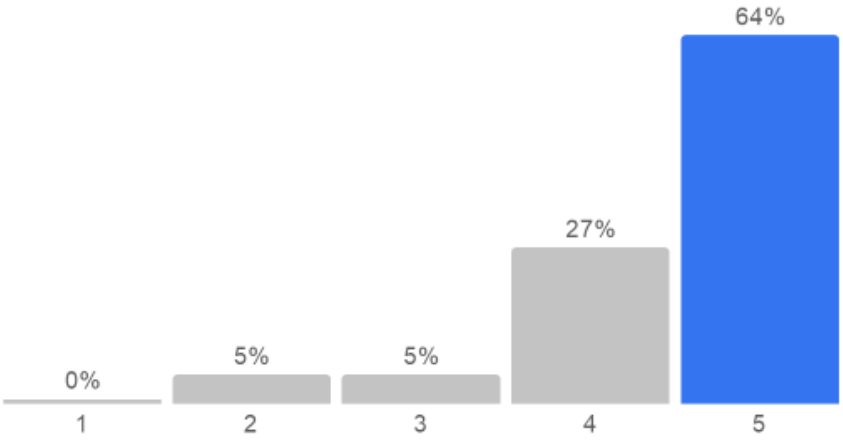
Rating poll

Please indicate how much you agree with the following statements, with 5: Fully agree & 1: Fully disagree (3/3)

0 2 2

MaaS and Traffic Management integrated operations can contribute to a multiple benefit for the Urban sustainability objective

Score: 4.5



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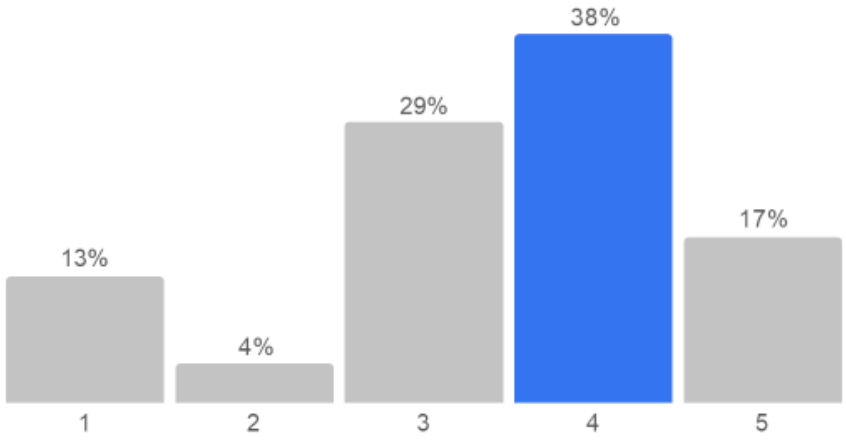
Rating poll

Please indicate how much you agree with the following statements, with 5: Fully agree & 1: Fully disagree (1/3)

0 2 4

Multimodal mobility management should prioritise space in city centres for walking over micromobility.

Score: 3.4



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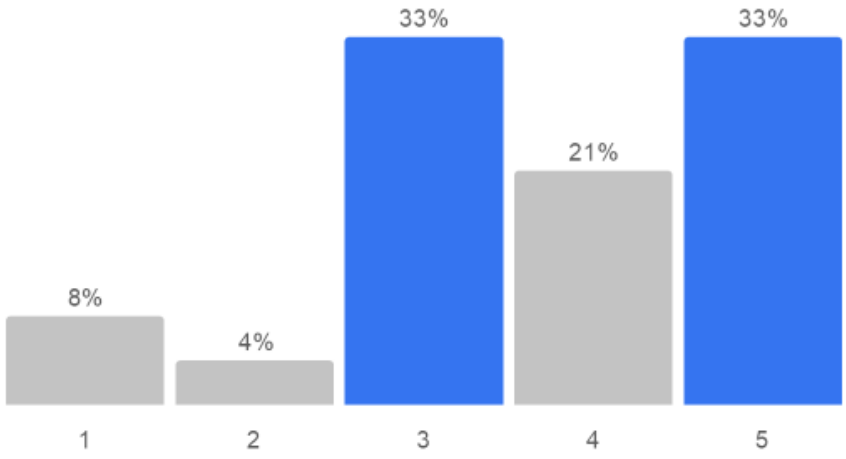
Rating poll

Please indicate how much you agree with the following statements, with 5: Fully agree & 1: Fully disagree (2/3)

0 2 4

Multimodal mobility management should prioritise space in city centres for bike over cars.

Score: 3.7



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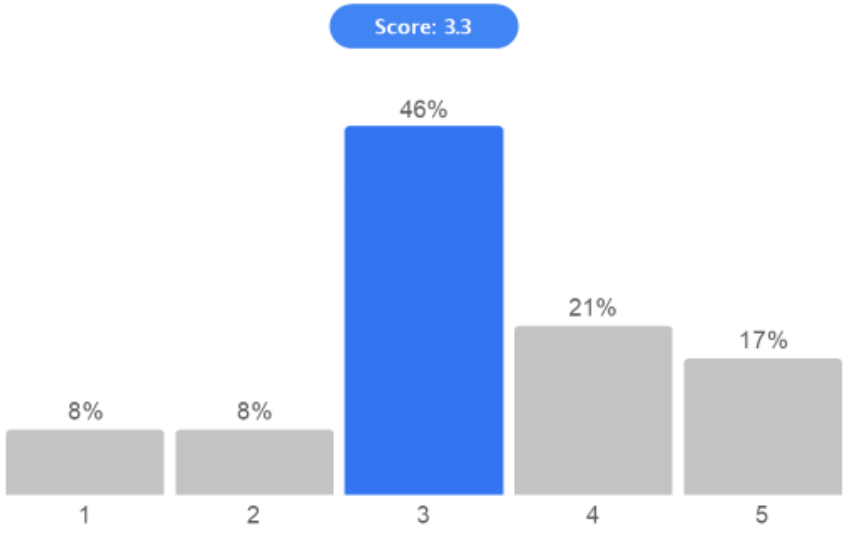
Rating poll

Please indicate how much you agree with the following statements, with 5: Fully agree & 1: Fully disagree (3/3)

0 2 4

Multimodal mobility management should prioritise space in city centres for public transport over shared services.

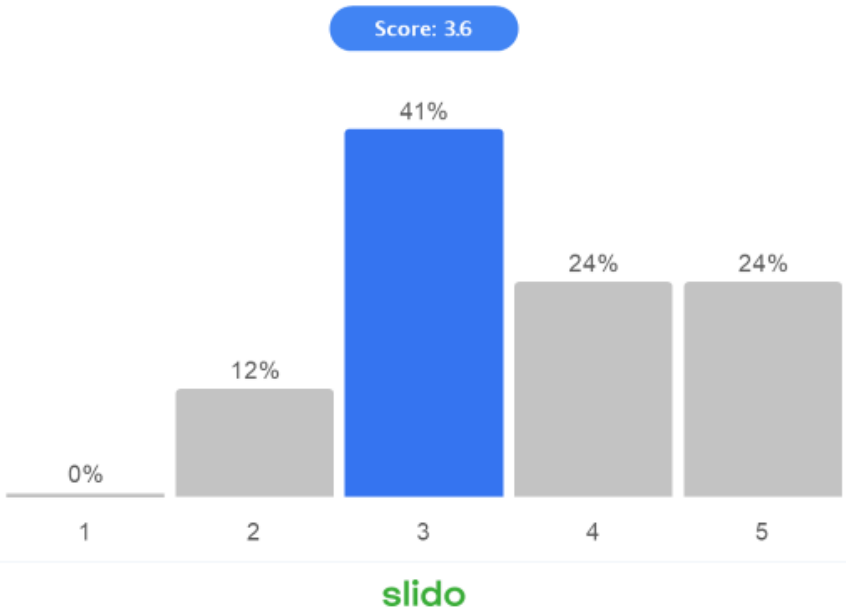


Rating poll

Please indicate how much you agree with the following statements, with 5: Fully agree & 1: Fully disagree (1/4)

0 1 7

Multimodal Mobility Management should continue to focus on congestion and flows of different modes (private cars, public transport, ride-hailing and taxis, shared cars, bikes, micromobility vehicles, walking…urban air vehicles)



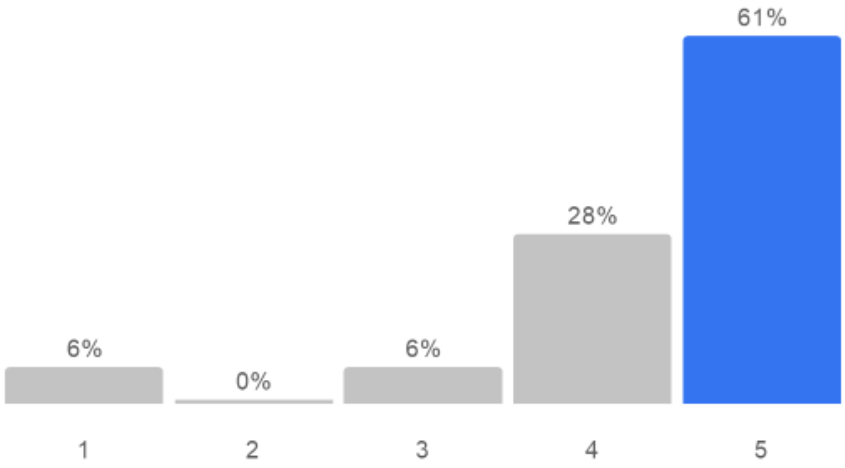
Rating poll

Please indicate how much you agree with the following statements, with 5: Fully agree & 1: Fully disagree (2/4)

Multimodal Mobility Management should go beyond the flows and mobility to focus on accessibility, space and reasons/conditions for people to move

0 1 8

Score: 4.4



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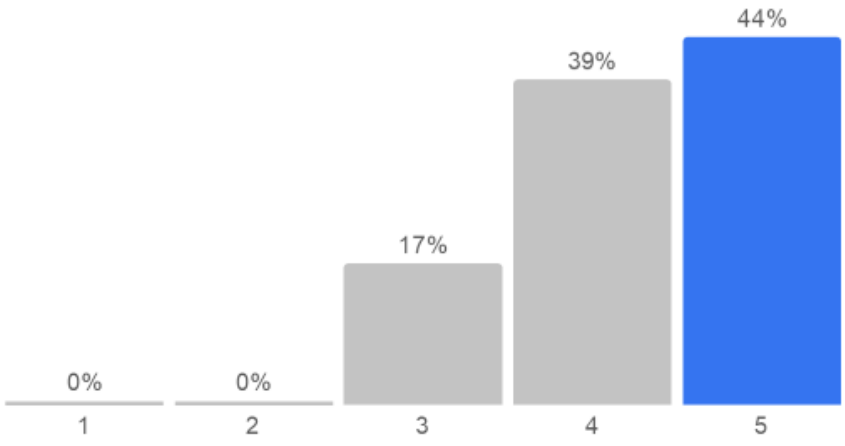
Rating poll

Please indicate how much you agree with the following statements, with 5: Fully agree & 1: Fully disagree (3/4)

Multimodal Mobility Management should focus on the "connection points" between all modes, being them parking space, stations or more generally the curb

0 1 8

Score: 4.3



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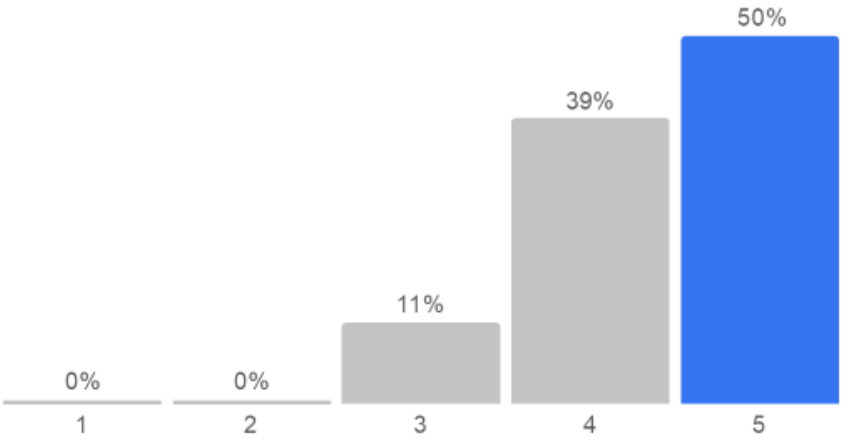
Rating poll

Please indicate how much you agree with the following statements, with 5: Fully agree & 1: Fully disagree (4/4)

0 1 8

Multimodal Mobility Management should focus on people rather than vehicles and provide valuable information for people to choose multimodality

Score: 4.4



slido

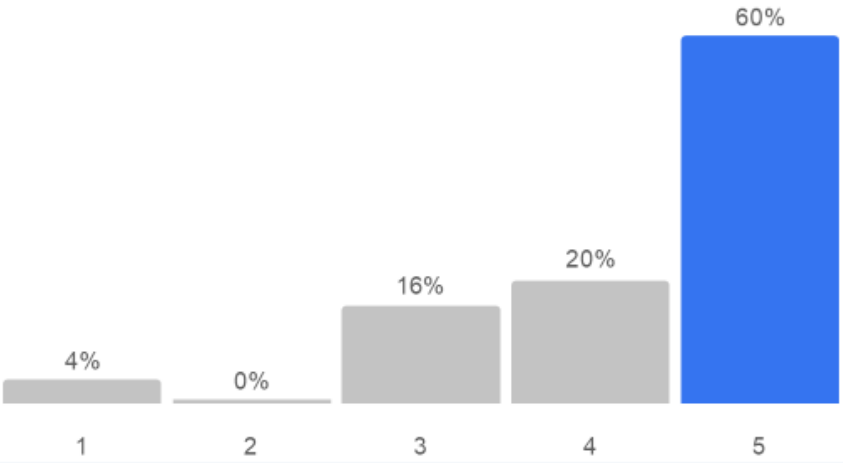
Rating poll

TM and MaaS can cooperate and offer relevant services towards structuring a multimodal mobility management scheme. On the lists below, please rate the TM Data/Services relevant to MaaS on a scale from 5: Fully agree & 1: Fully disagree (1/5)

0 2 5

Adaptive and dynamic traffic control

Score: 4.3



slido

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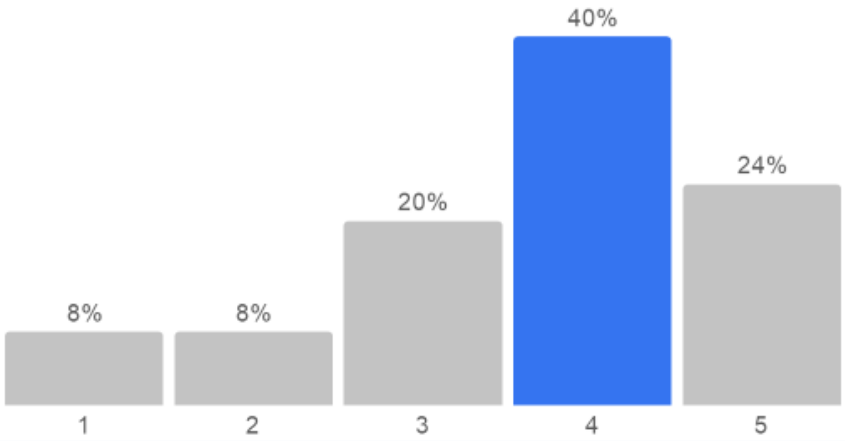
TM and MaaS can cooperate and offer relevant services towards structuring a multimodal mobility management scheme. On the lists below, please rate the TM Data/Services relevant to MaaS on a scale from 5: Fully agree & 1: Fully disagree (2/5)

0 2 5

C-ITS services (Traffic light service such as speed advice, count down, Road hazard warning, In-vehicle signage)

Score: 3.6



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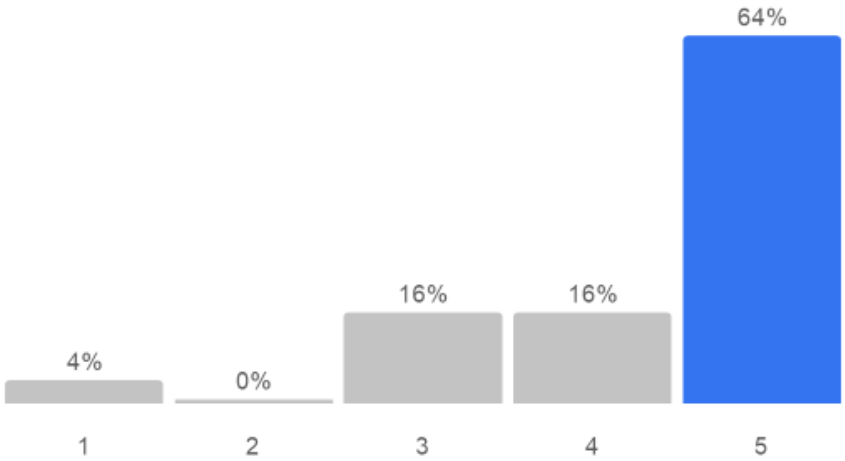
Rating poll

TM and MaaS can cooperate and offer relevant services towards structuring a multimodal mobility management scheme. On the lists below, please rate the TM Data/Services relevant to MaaS on a scale from 5: Fully agree & 1: Fully disagree (3/5)

0 2 5

Advanced navigation services:

Score: 4.4



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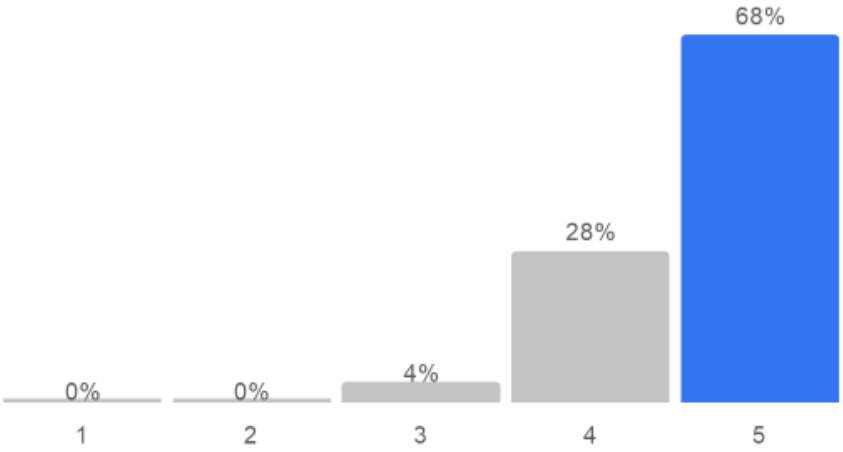
Rating poll

TM and MaaS can cooperate and offer relevant services towards structuring a multimodal mobility management scheme. On the lists below, please rate the TM Data/Services relevant to MaaS on a scale from 5: Fully agree & 1: Fully disagree (4/5)

0 2 5

Traffic status and event detection

Score: 4.6



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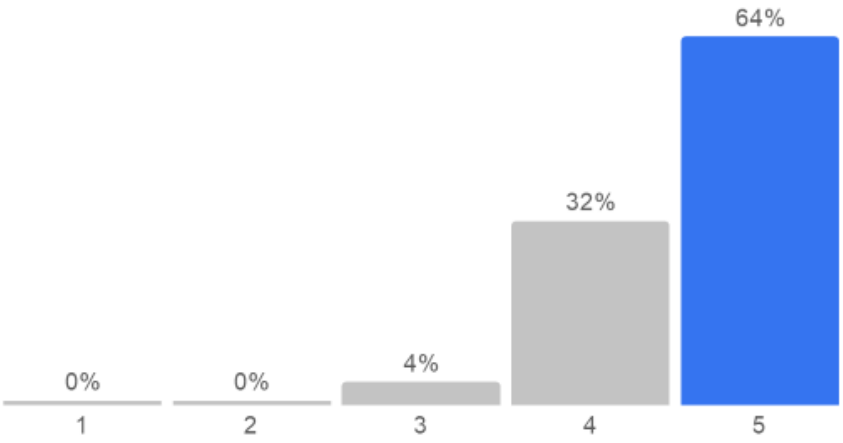
Rating poll

TM and MaaS can cooperate and offer relevant services towards structuring a multimodal mobility management scheme. On the lists below, please rate the TM Data/Services relevant to MaaS on a scale from 5: Fully agree & 1: Fully disagree (5/5)

0 2 5

Congestion charging and Zone Access Control areas

Score: 4.6



slido

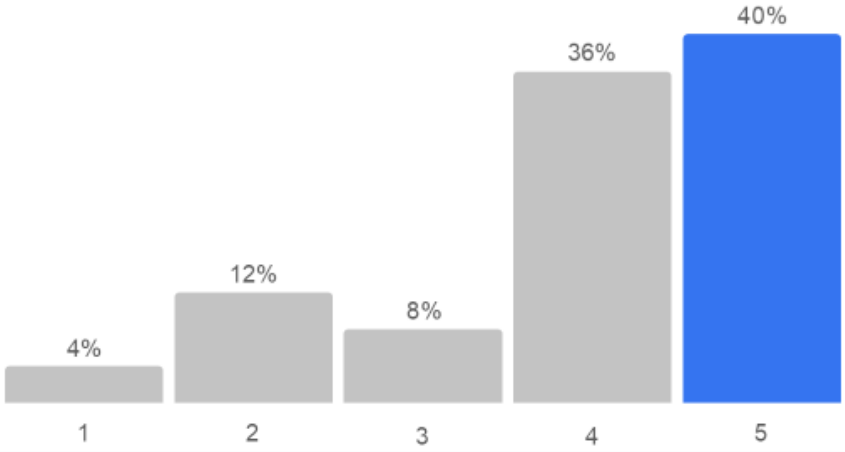
Rating poll

Traffic management and Mobility as a Service (MaaS) can cooperate and offer relevant services to each other towards the goal of structuring a multimodal mobility management scheme. On the lists below, please rate the MaaS Data/Services relevant to Traffic Management on a scale from 5: Fully agree & 1: Fully disagree (1/8)

0 2 5

All booked multi-modal route requests

Score: 4.0



slido

Rating poll

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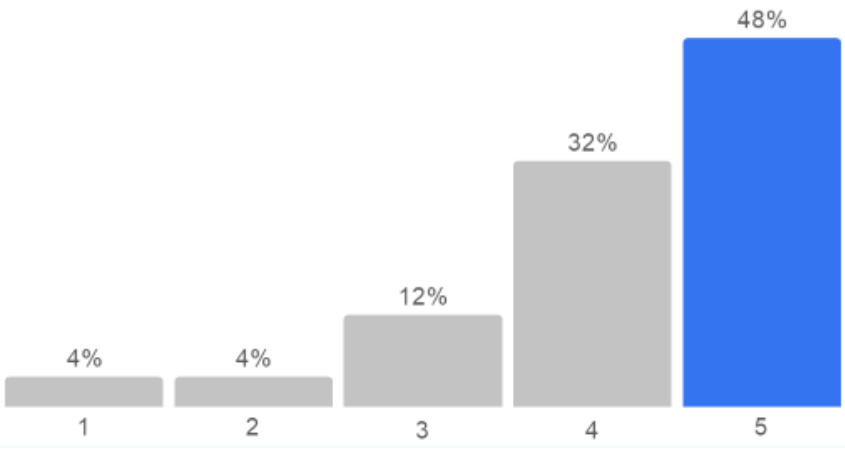
0 2 5

Actual and forecast passenger loads for mobility service providers

Score: 4.2



slido

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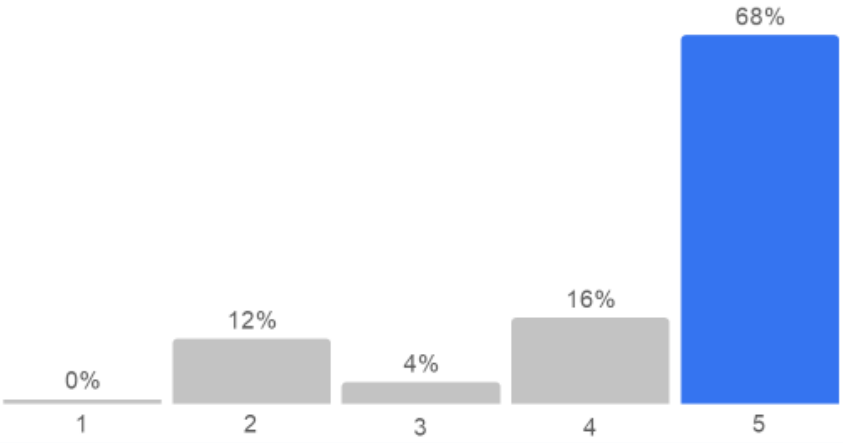
0 2 5

Real time vehicle locationinformation (telematics)

Score: 4.4



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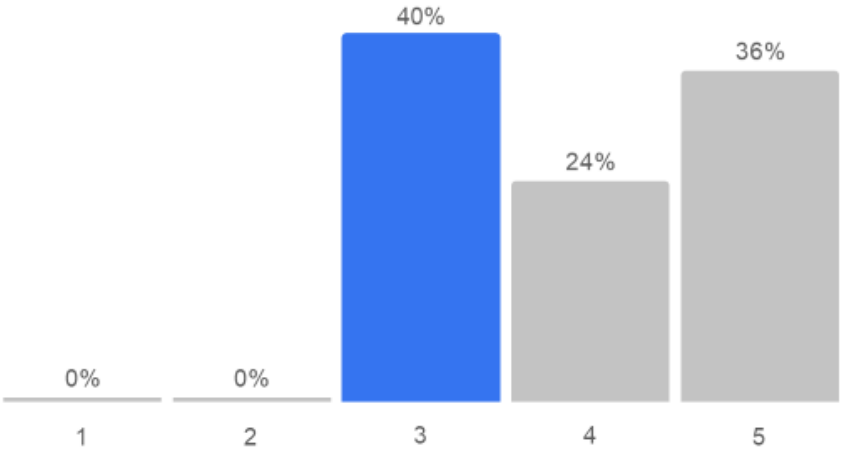
0 2 5

Mobility Service alerts

Score: 4.0



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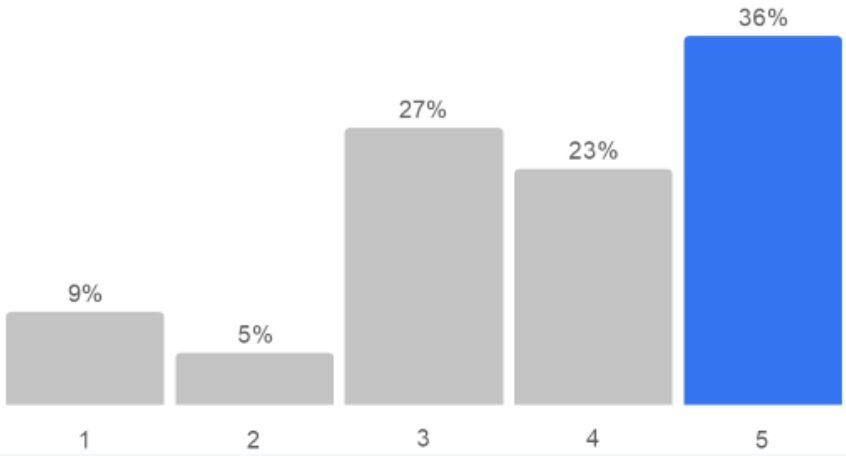
Rating poll

Traffic management and Mobility as a Service (MaaS) can cooperate and offer relevant services to each other towards the goal of structuring a multimodal mobility management scheme. On the lists below, please rate the MaaS Data/Services relevant to Traffic Management on a scale from 5: Fully agree & 1: Fully disagree (5/8)

0 2 2

Freight services

Score: 3.7



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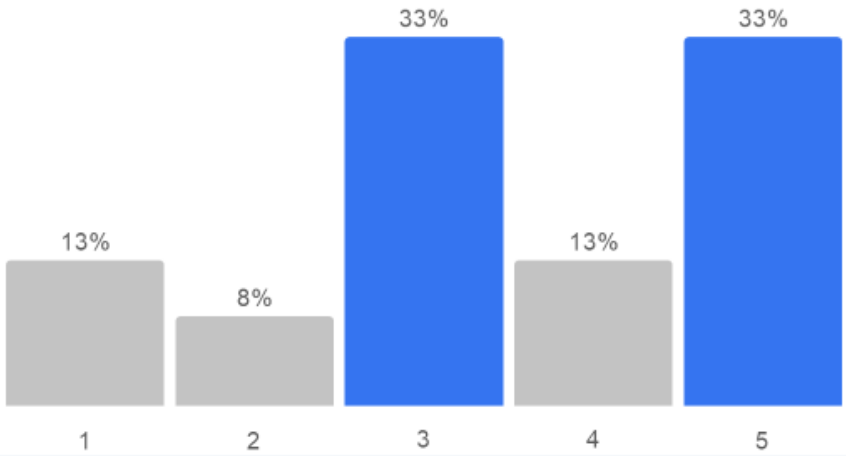
Rating poll

Traffic management and Mobility as a Service (MaaS) can cooperate and offer relevant services to each other towards the goal of structuring a multimodal mobility management scheme. On the lists below, please rate the MaaS Data/Services relevant to Traffic Management on a scale from 5: Fully agree & 1: Fully disagree (6/8)

0 2 4

User Feedback

Score: 3.5



slido

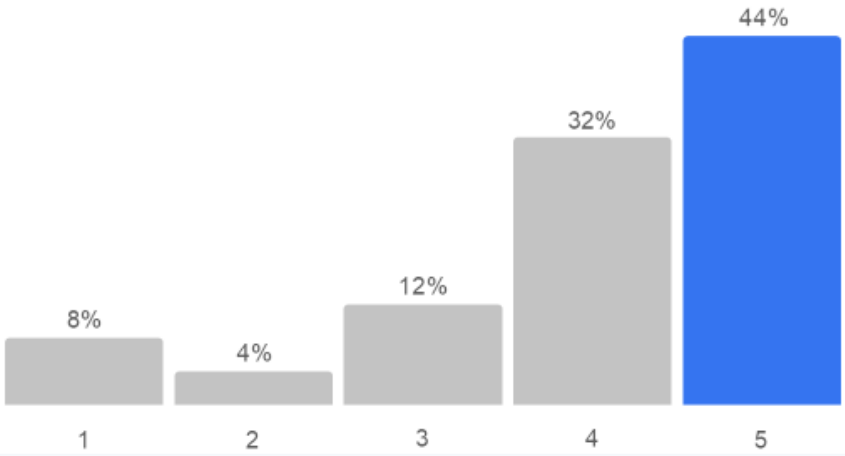
Rating poll

Traffic management and Mobility as a Service (MaaS) can cooperate and offer relevant services to each other towards the goal of structuring a multimodal mobility management scheme. On the lists below, please rate the MaaS Data/Services relevant to Traffic Management on a scale from 5: Fully agree & 1: Fully disagree (7/8)

0 2 5

User data(such as probe data)

Score: 4.0



slido

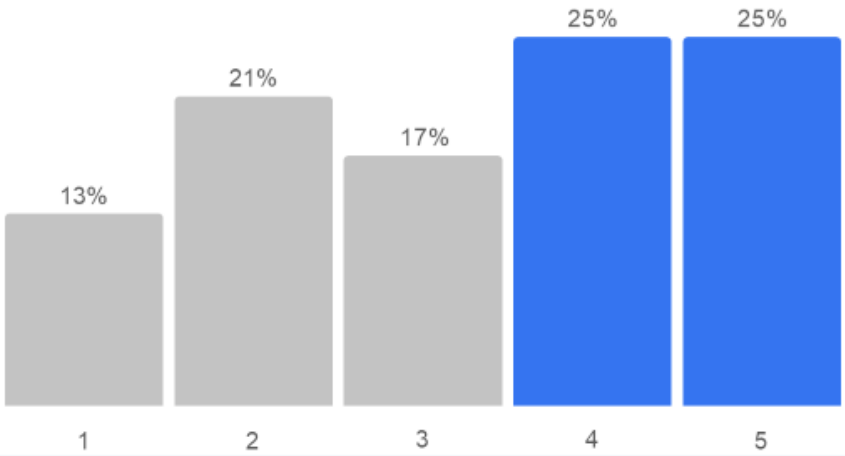
Rating poll

Traffic management and Mobility as a Service (MaaS) can cooperate and offer relevant services to each other towards the goal of structuring a multimodal mobility management scheme. On the lists below, please rate the MaaS Data/Services relevant to Traffic Management on a scale from 5: Fully agree & 1: Fully disagree (8/8)

0 2 4

Total costs of mobilityanalysis

Score: 3.3



slido

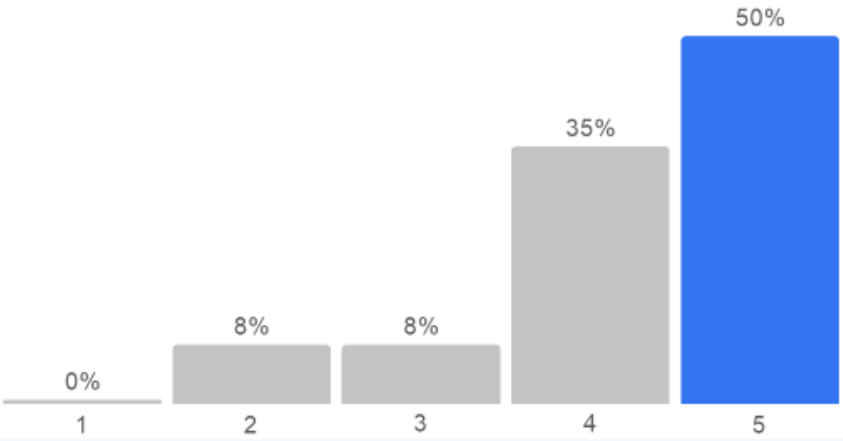
Rating poll

User engagement measures whether users find value in every product or service and is highly correlated with overall profitability. To improve MaaS user engagement, some essential user requirements joint with users' actions focused on user experience must be taken into account. Please rate the seven basic user requirements groups identified based on their importance on a scale from 5: Fully agree & 1: Fully disagree. (1/7)

0 2 6

Digital safety and security of services

Score: 4.3



slido

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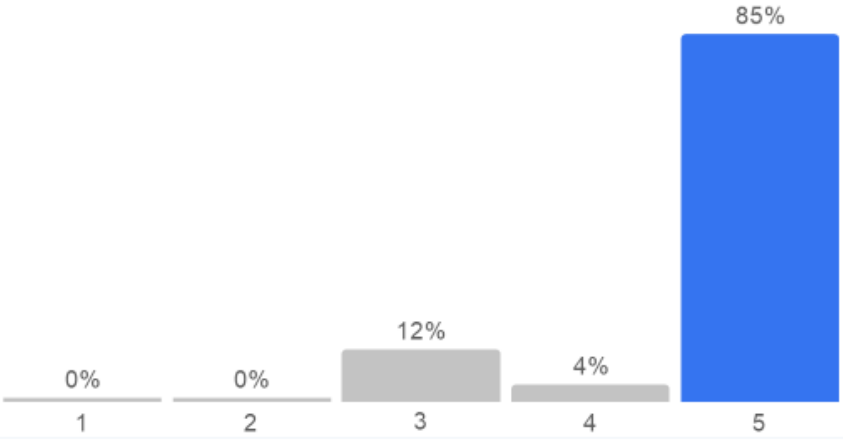
0 2 6

Convenience

Score: 4.7



slido

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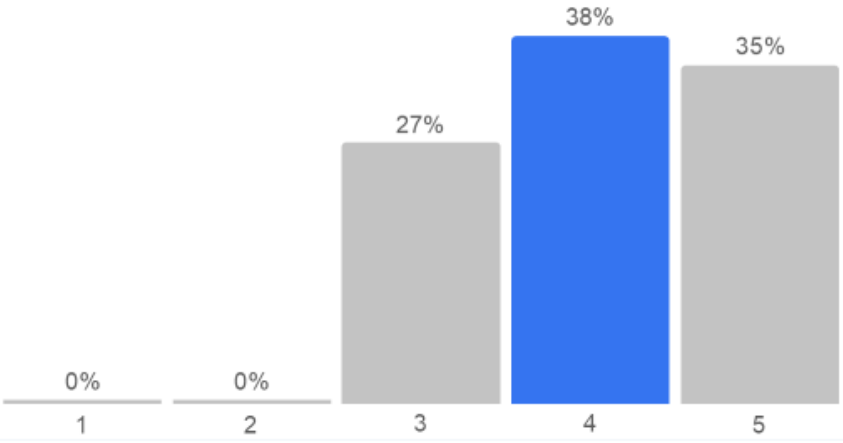
0 2 6

Inclusivity

Score: 4.1



slido

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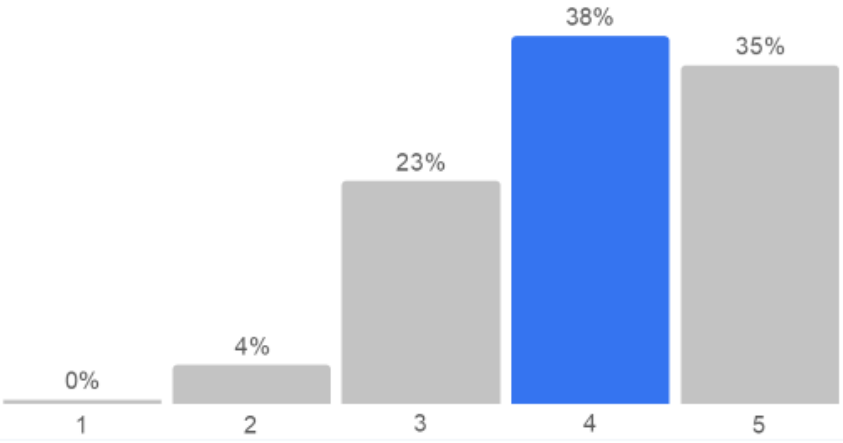
0 2 6

Customer Support

Score: 4.0



slido

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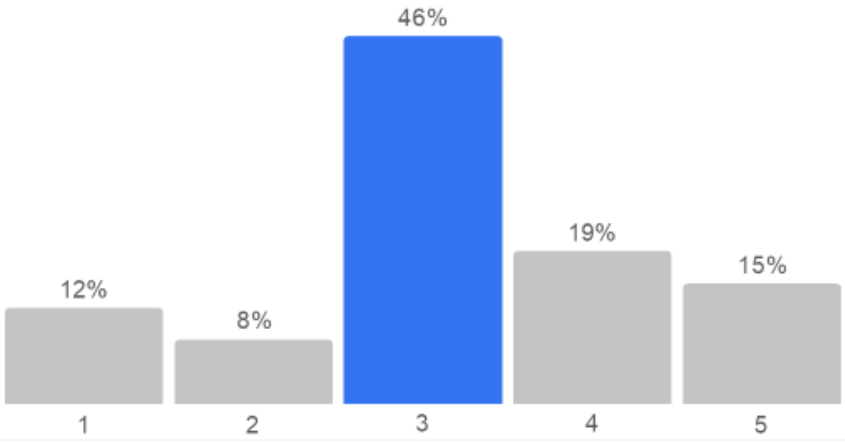
0 2 6

Gamification

Score: 3.2



slido

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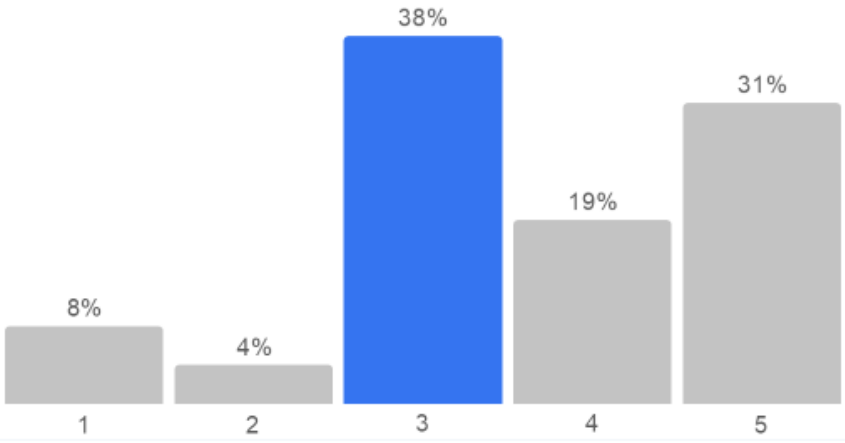
0 2 6

Loyalty scheme

Score: 3.6



slido

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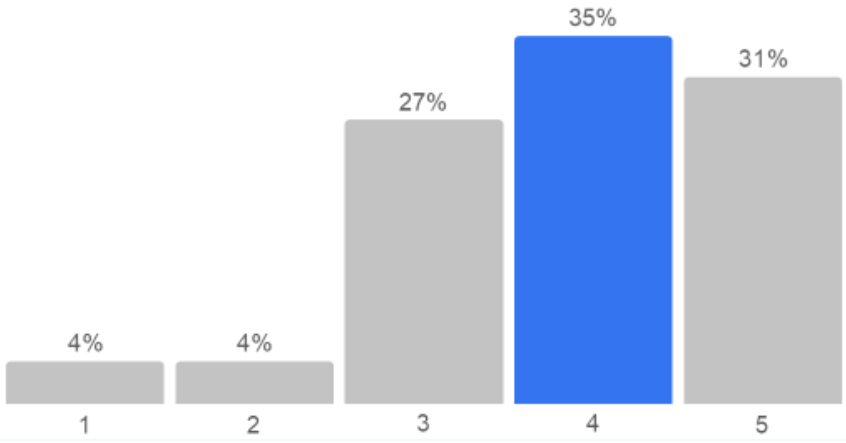
0 2 6

User Participation

Score: 3.8



slido

Open text poll

Please provide your take aways from the morning session

0 0 1

- Suitable Policy drivers for mobility management are potentially different depending by each town characteristics.. so the choice about which should be privileged in general in the question was vert arguable (e.g bike vs car)

slido

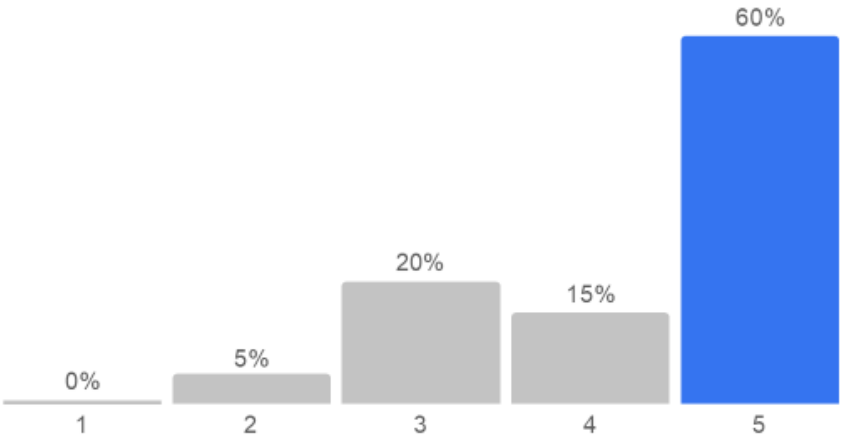
Rating poll

Please indicate how much you agree with the following statements, with 5: Fully agree & 1: Fully disagree (1/3)

0 2 0

A collaborative eco-system which includes both PT operators, private mobility operators of emerging mobility service providers, MaaS schemes and Traffic Management will contribute to Effective and sustainable mobility

Score: 4.3



slido

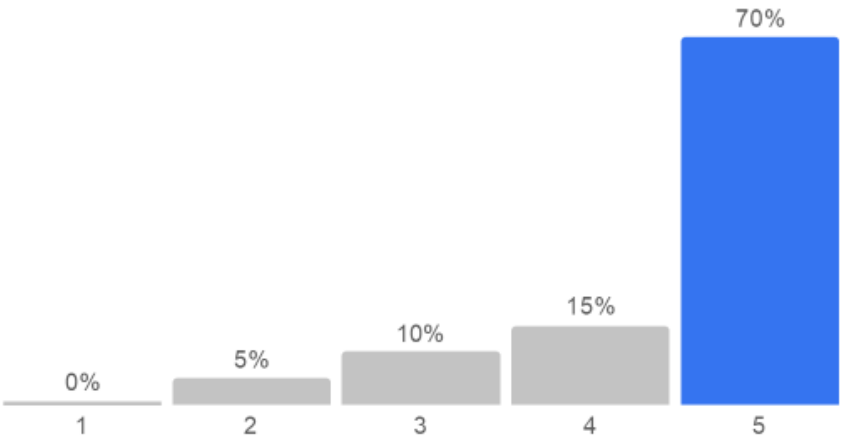
Rating poll

Please indicate how much you agree with the following statements, with 5: Fully agree & 1: Fully disagree (2/3)

0 2 0

Win win win business models are important for succesful cooperation

Score: 4.5



slido

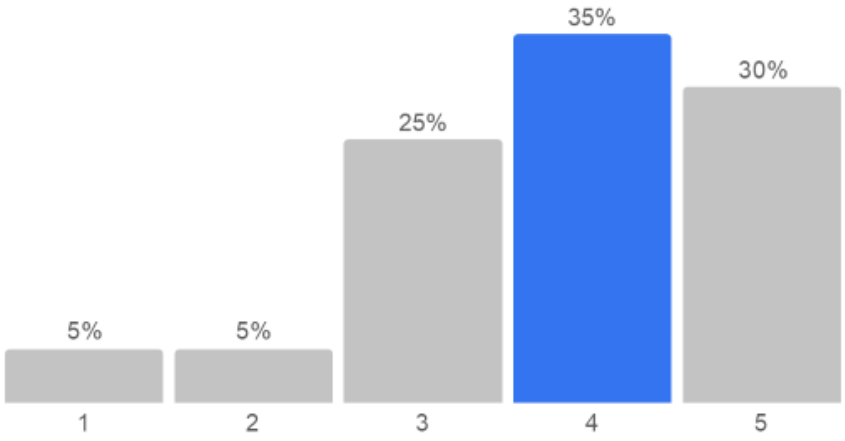
Rating poll

Please indicate how much you agree with the following statements, with 5: Fully agree & 1: Fully disagree (3/3)

0 2 0

MaaS schemes can be the catalyst in expanding TM in geographical space through the inclusion of multimodality

Score: 3.8



slido

Multiple-choice poll (Multiple answers)

0 2 0

Who are the key stakholders in the necessary integration between MaaS and TM2.0? (Please chose max 3)
(1/2)

Local Governments
50 %

Central Government
20 %

Traffic Management Authority
65 %

Traffic service providers
15 %

Public Transport Authorities
30 %

slido

Multiple-choice poll (Multiple answers)

Who are the key stakholders in the necessary integration between MaaS and TM2.0? (Please chose max 3)
(2/2)

0 2 0

Public Transport operators
15 %

Mobility operators who are profiting from increased usage of their system
35 %

MaaS operator
70 %

slido

Multiple-choice poll (Multiple answers)

Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Local Government? (Choose max 2)

0 1 8

Fiscal incentives such as tax reductions
6 %

Economic incentives
11 %

Reduced congestion
67 %

Reduced environmental impact
78 %

Accessibility to mobility services
33 %

slido

Multiple-choice poll (Multiple answers)

Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Central Government? (Choose max 2)
(1/2)

0 1 6

Fiscal incentives such as tax reductions
13 %

Economic incentives
50 %

Reduced congestion
50 %

Reduced environmental impact
63 %

slido

Multiple-choice poll (Multiple answers)

Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Central Government? (Choose max 2)
(2/2)

0 1 6

Accessibility to mobility services
19 %

slido

Multiple-choice poll (Multiple answers)

Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Traffic Management Authority? (Choose max 2)
(1/2)

0 1 8

1. Fiscal incentives such as tax reductions
0 %

2. Economic incentives
22 %

3. Reduced congestion
94 %

4. Reduced environmental impact
44 %

slido

Multiple-choice poll (Multiple answers)

Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Traffic Management Authority? (Choose max 2)
(2/2)

0 1 8

5. Accessibility to mobility services
33 %

slido

Multiple-choice poll (Multiple answers)

Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Traffic service providers? (Choose max 2)
(1/2)

0 1 7

1. Fiscal incentives such as tax reductions
18 %

2. Economic incentives
100 %

3. Reduced congestion
35 %

4. Reduced environmental impact
0 %

slido

Multiple-choice poll (Multiple answers)

Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Traffic service providers? (Choose max 2)
(2/2)

0 1 7

5. Accessibility to mobility services
18 %

slido

Multiple-choice poll (Multiple answers)

Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Public Transport operators? (Choose max 2)
(1/2)

0 1 7

1. Fiscal incentives such as tax reductions
18 %

2. Economic incentives
53 %

3. Reduced congestion
47 %

4. Reduced environmental impact
12 %

slido

Multiple-choice poll (Multiple answers)

Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Public Transport operators? (Choose max 2)
(2/2)

0 1 7

5. Accessibility to mobility services
59 %

slido

Multiple-choice poll (Multiple answers)

Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Mobility operators who are profiting from increased usage of their system? (Choose max 2)
(1/2)

0 1 7

1. Fiscal incentives such as tax reductions
29 %

2. Economic incentives
100 %

3. Reduced congestion
18 %

4. Reduced environmental impact
0 %

slido

Multiple-choice poll (Multiple answers)

Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for Mobility operators who are profiting from increased usage of their system? (Choose max 2)
(2/2)

0 1 7

5. Accessibility to mobility services
35 %

slido

Multiple-choice poll (Multiple answers)

Given the necessary data exchanges between the platforms, and given the key stakeholders involved in this process, what are the key benefits and drivers for MaaS scheme? (Choose max 2)

0 1 8

1. Fiscal incentives such as tax reductions
6 %
2. Economic incentives
89 %
3. Reduced congestion
11 %
4. Reduced environmental impact
6 %
5. Accessibility to mobility services
67 %

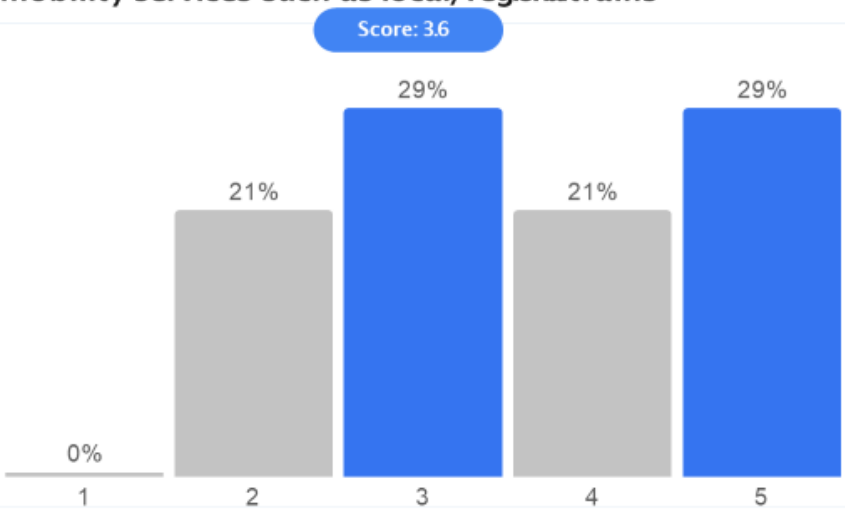
slido

Rating poll

MaaS can become the "tool" to integrate TM operations at neighbouring geographical locations as well as with long haul public transport and Logistic operations. Please rate the influence that MaaS can have in the following scenarios; 5: high influence and 1: no influence. (1/4)

0 1 4

Integration of urban traffic management with regional traffic management and regional mobility services such as local/regional trains



slido

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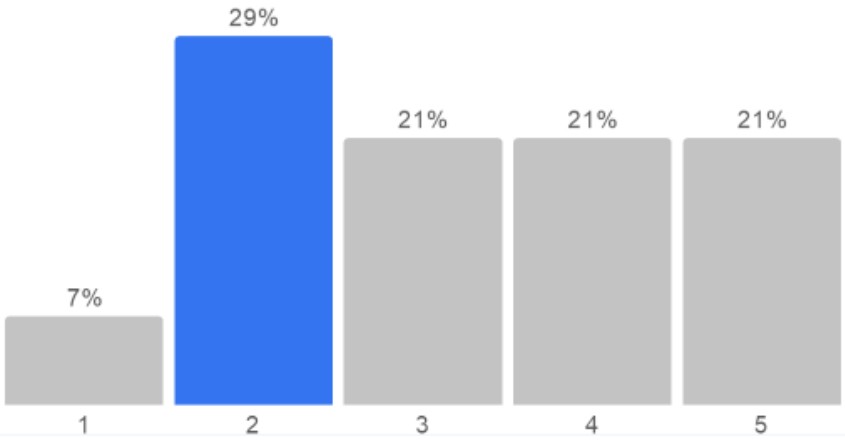
MaaS can become the "tool" to integrate TM operations at neighbouring geographical locations as well as with long haul public transport and Logistic operations. Please rate the influence that MaaS can have in the following scenarios; 5: high influence and 1: no influence. (2/4)

0 1 4

Integration of urban traffic management with highway traffic management and long haul mobility services

Score: 3.2



slido

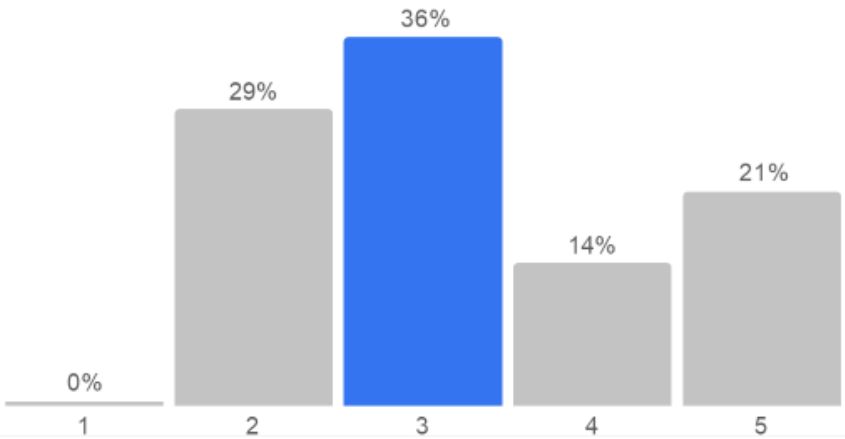
Rating poll

MaaS can become the "tool" to integrate TM operations at neighbouring geographical locations as well as with long haul public transport and Logistic operations. Please rate the influence that MaaS can have in the following scenarios; 5: high influence and 1: no influence. (3/4)

0 1 4

Integration of urban traffic management of two connected cities with highway traffic management and long haul mobility services

Score: 3.3



slido

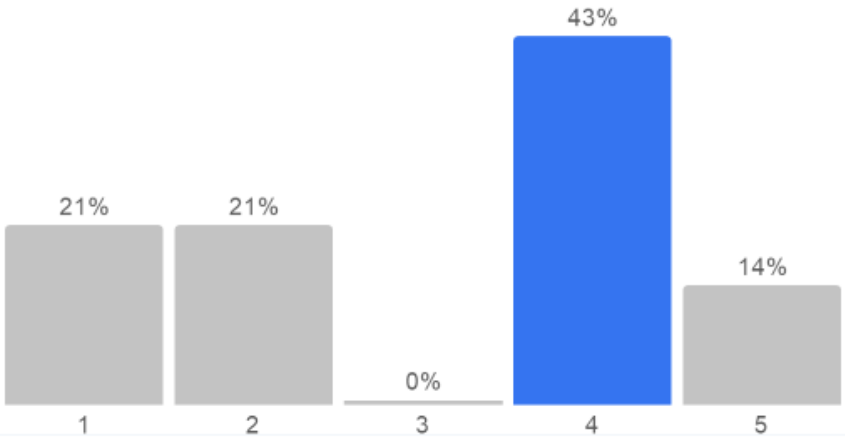
Rating poll

MaaS can become the "tool" to integrate TM operations at neighbouring geographical locations as well as with long haul public transport and Logistic operations. Please rate the influence that MaaS can have in the following scenarios; 5: high influence and 1: no influence. (4/4)

0 1 4

Integration of urban traffic management with Logistic operations and Logistic hubs such as Ports

Score: 3.1



slido

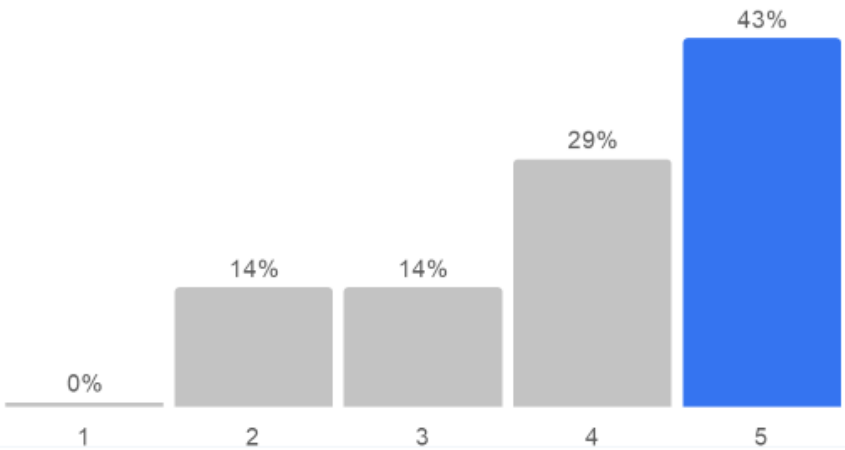
Rating poll

Various types of incentives can be used to motivate users to follow guidelines provided by MaaS systems, which are supporting sustainable mobility goals and traffic management strategies. Please rate the impact the following incentives can have on user behaviour; 5: equals to high impact and 1: equals to no impact. (1/4)

0 1 4

Fiscal incentives such as tax reductions if MaaS is adopted over private car ownership

Score: 4.0



slido

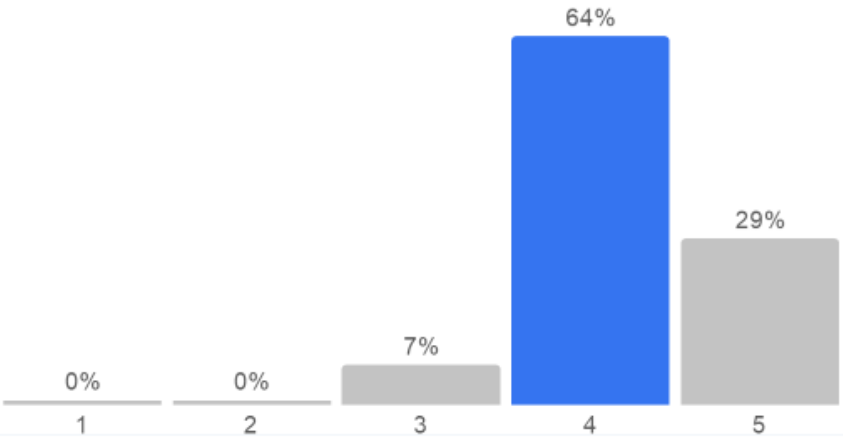
Rating poll

Various types of incentives can be used to motivate users to follow guidelines provided by MaaS systems, which are supporting sustainable mobility goals and traffic management strategies. Please rate the impact the following incentives can have on user behaviour; 5: equals to high impact and 1: equals to no impact. (2/4)

0 1 4

2. Economic incentives such as discounts, if for example modal shift recommendation is followed

Score: 4.2



slido

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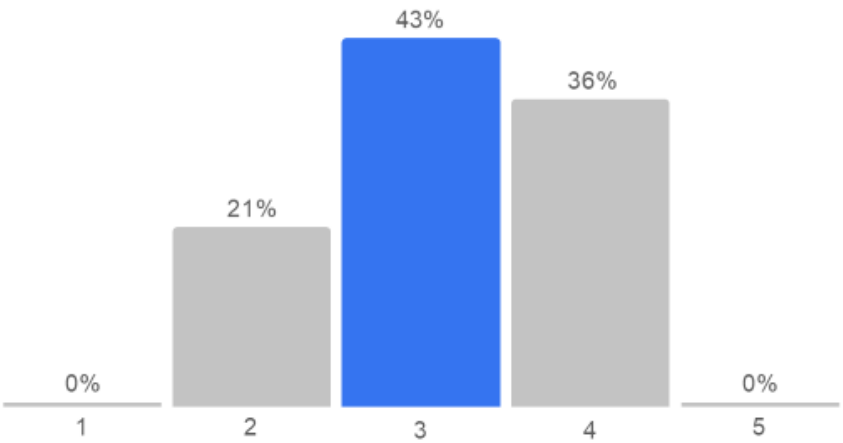
Various types of incentives can be used to motivate users to follow guidelines provided by MaaS systems, which are supporting sustainable mobility goals and traffic management strategies. Please rate the impact the following incentives can have on user behaviour; 5: equals to high impact and 1: equals to no impact. (3/4)

0 1 4

Loyalty points if for example route guidance or park & ride recommendation is followed

Score: 3.1



slido

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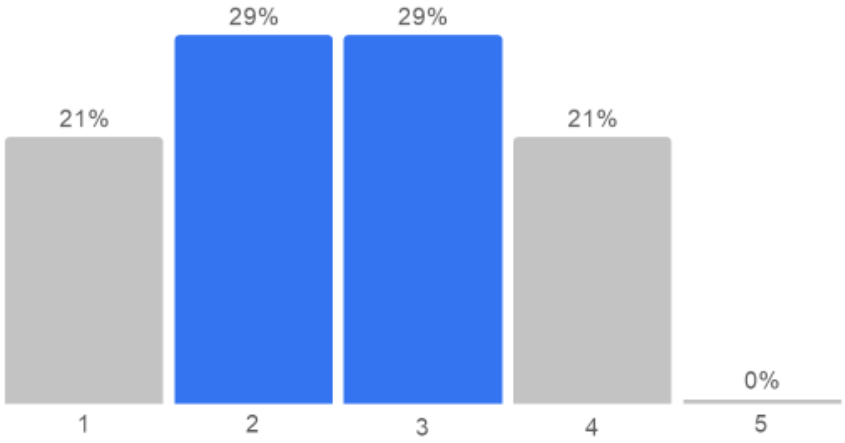
0 1 4

Moral rewards if socially responsible behaviour is followed by users

Score: 2.5



slido

Open text poll

What are the technical, business and market barriers for the integration of TM 2.0 & MaaS (1/2)

0 1 0

- The lack of a shared vision and entrepreneurial mindset. Little awareness of users' needs/preferences and key customer segments.
- Business: collaboration between public entities (TM agency, PT Operators, city administration) as well as between public and private stakeholders)(data sharing, loosing end user contact), missing governance and knowledge/tools to take responsibility by city administrations Market: adoption of MaaS low due to service offering coverage and quality in low density and rural areas Technical: missing standards
- Lack in motivation of sectors. How would someone (e.g. a local government) make a sector (e.g. PT operator) aware of the other sides' (e.g traffic management sector) benefits?
- Envy, unwillingness to share to keep info from competitors
- Different business objectives

slido

Open text poll

What are the technical, business and market barriers for the integration of TM 2.0 & MaaS (2/2)

0 1 0

by different stakeholders especially between public and private

- Lack of trust?
- Incentives to enhance TM
- Necessity to overhaul fiscal schemes to make MaaS and TM2.0 work.
- Administrative structures,
- Funding both in public sector and in maas organisations

slido

Open text poll

Please provide your take aways from the afternoon session

0 0 1

- In many cases the questions were leading. Better (more neutral formulering) would be better. Good mix of people, but Some stakeholders are still missing.

slido

Multiple-choice poll (Multiple answers)

The incentives will benefit sustainable mobility. Which entity should be burdened with the costs of those incentives? (Max 3)
(1/2)

0 1 2

1. Local Governents
75 %

2. Central Government
75 %

3. Traffic Management Authority
0 %

4. Traffic service providers
0 %

5. Public Transport Authorities
0 %

slido

Multiple-choice poll (Multiple answers)

The incentives will benefit sustainable mobility. Which entity should be burdened with the costs of those incentives? (Max 3)
(2/2)

0 1 2

6. Public Transport operators
8%

7.Mobility operators who are profiting from increased usage of their system
42 %

8. MaaS scheme
17 %

9. Users
67 %

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