



MPC for MaaS use case

Use Case Playbook v1.0

Agenda

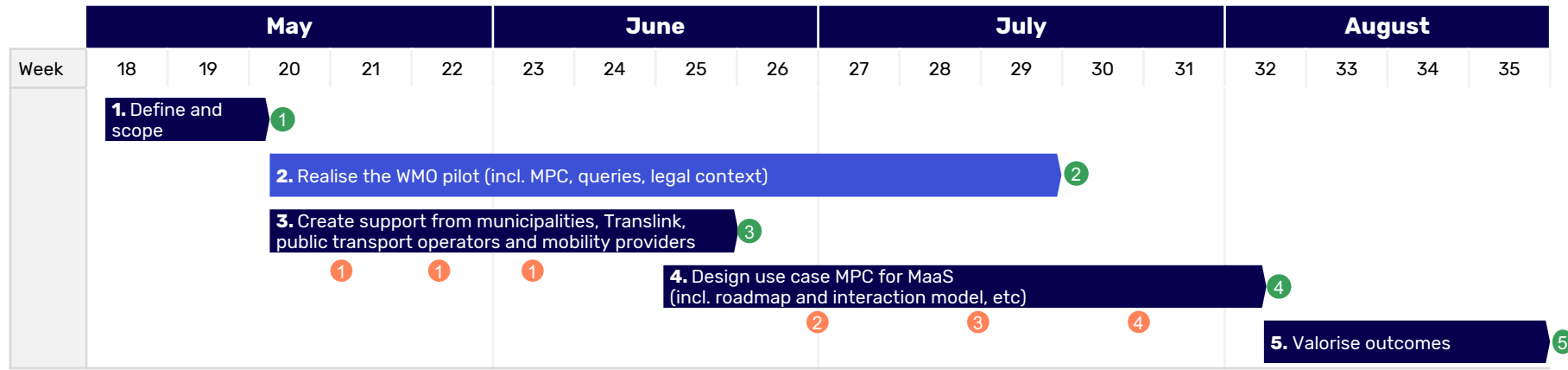
1. Plan of Approach

2. Use Case Playbook detailing value potential of MPC for MaaS

Approach and timelines for the “MPC for MaaS use case”

Note: Depending on the required time for track 3, track 4 can start earlier / later

High level planning for the MPC for MaaS use case



Legend deliverables

- 1 Defined pilot and scope for the WMO pilot
 - 2 Functioning pilot
 - 3 Commitment key stakeholders to take part in workshops
 - 4 Design of the MPC for MaaS use case
 - 5 Publication outcomes on the DSC website and other channels
- 1 Interviews
 - 2 Workshop - Scope en ambition MPC for MaaS
 - 3 Workshop - Interaction model, roles & esponsibilities
 - 4 Workshop - Roadmap MPC for MaaS
- DSC lead
 - Roseman Labs lead

Agenda

1. Plan of Approach

2. Use Case Playbook detailing value potential of MPC for MaaS

The mobility sector has to innovate to become more accessible, affordable, convenient and sustainable



Accessible

- Accessible transport lowers barriers for use of the transport system for all and ensures everyone can make use of it
- Accessibility is important as infrastructure is public domain
- Providing public transport services in rural areas and enabling people in wheelchairs to enter trains easily are examples of accessibility measures



Affordable

- Affordable transport ensures that (almost) every citizen can afford using the transportation system
- Affordability is important as the infrastructure is a public good
- An example of affordable are subsidised electric cars, making green transport more competitive is an example of making mobility more affordable



Convenient

- Convenient transport means that travelling is simple to arrange, fast and comfortable to do
- Convenience is important to optimally realise the needs of the travellers
- The high-speed train between Rotterdam and Amsterdam, and door-to-door route planner apps are examples of making mobility more convenient

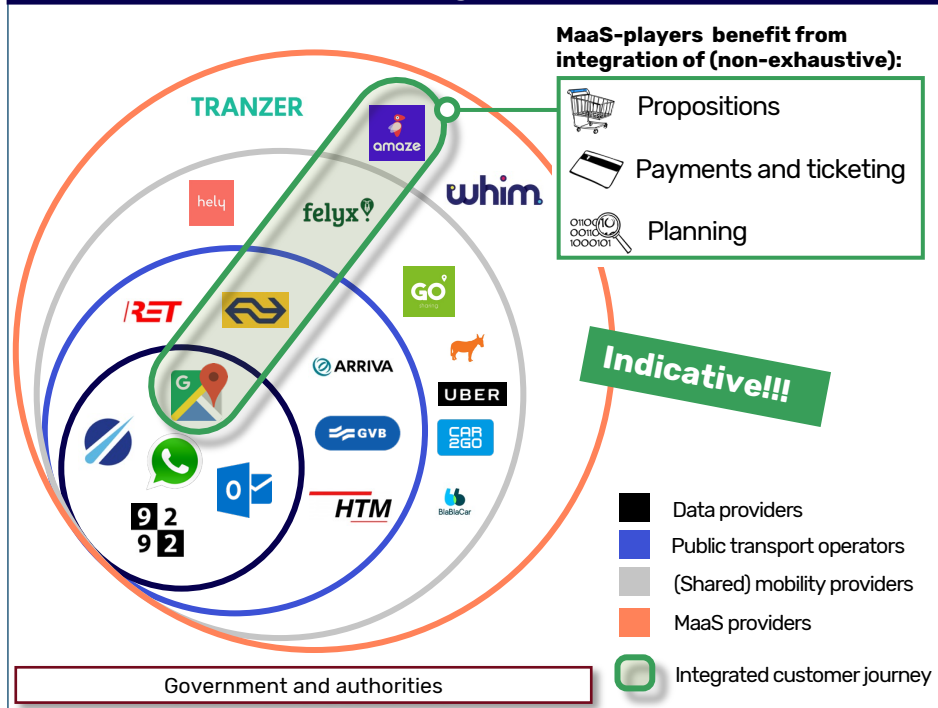


Sustainable

- Sustainable transport lowers the climate footprint of travelling
- Sustainability is important to contribute to a green future for our planet
- The sharing economy, where an asset (e.g. scooter or bike) can be used by different people is an example of sustainable mobility

A MaaS ecosystem is key to innovate mobility, however privacy and commercial barriers hinder the data sharing required for MaaS

Dutch MaaS ecosystem (high-level)



Data collaboration is key to develop MaaS

- Mobility as a Service (MaaS) is the integration of different transport modes (e.g. trains and shared bikes) to provide an alternative means of mobility compared to asset ownership
- MaaS improves matching of mobility supply and demand, which contributes to more accessible, affordable, convenient and sustainable mobility
- Data sharing is essential for a successful MaaS ecosystem as an integral view on travel patterns and customer behaviour is needed to optimally balance supply and demand

Barriers for data collaboration required for MaaS

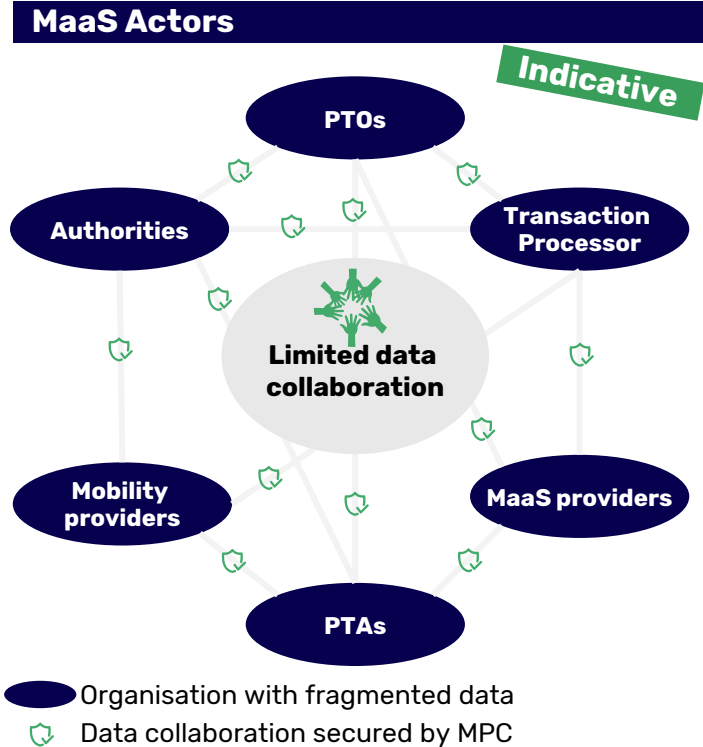
Commercial sensitivity:

Mobility providers are hesitant to share their data as it is a key asset for their business model and competition with other mobility providers

Privacy:

Sharing of data is limited due GDPR compliance as much relevant data contains Personal Identifiable Information (PII)

Multi-party computation (MPC) can reduce barriers in data collaboration as sensitive source data is not revealed



Source: Data Sharing Coalition analysis

Introduction to Multi-Party Computation (MPC)

- **Sharing insights, not data.** Multi-party computation (MPC) allows different organisations to jointly create insights from data without any individual organisation revealing their source data to other organisations involved
- **In control over data.** Source data from individual organisations is secured by fragmenting and encrypting it before providing it to MPC. This means that each organisation retains control over their own data
- **Aggregate insights from various sources.** MPC creates the requested insights by performing calculations on fragmented and encrypted data from different organisations

Potential value of MPC for MaaS data collaboration

- **Reducing commercial barriers.** MPC-based data collaboration reduces commercial barriers as source data is not at all transferred and will not be revealed in computations. This prevents potential competitors from benefitting using one's data for own commercial purposes.
- **Reducing privacy sensitivity.** MPC-based data collaboration reduces the legal barriers of *sharing* data, as no PII is shared. Organisations still need to *process* PII. However, monitoring legal context and impact of multi-party computation is key as it is still in development.

MPC for MaaS will be tested in the 'Inclusief Reizen' pilot aiming to shift travellers towards cheaper and inclusive mobility options

Introduction pilot 'Inclusief Reizen' and challenge

Introduction pilot

- Publiek Vervoer Groningen Drenthe (i.e. Publiek Vervoer) is a Dutch organisation that, on behalf of the Dutch transport authorities, is responsible for innovating and developing the mobility system and monitors whether tenders are executed accordingly in the region
- Recently, Publiek Vervoer started the 'Inclusief Reizen' pilot to keep WMO¹ policies affordable and accessible while its usage grows
- For the pilot, a specific segment of WMO-travellers are offered free public transport to stimulate a shift in their mobility habits (mostly taxi and other personalised mobility options)

Stimulating WMO-travellers to more efficient public transport options instead of WMO could result in:

- **Cost reduction of *€1 - 1.5 mln.** Cost reduction is due to 15-20% less use of costly mobility options in region Groningen-Drenthe
- **Improved health and sustainability.** Regular public transport use stimulates health, social participation (lowers the threshold for going out more often) and sustainability

Status pilot

Status 'Inclusief Reizen' pilot

- The pilot is currently ongoing, but at this point no detailed analyses can be performed to gain insights in whether WMO-travellers behaviours change, after offered free public transport options
- This is due to data (including personal identifiable information) is spread across multiple organisations
- Therefore in this use case, MPC technology will be applied to gain insights in the travel patterns of WMO-travellers by combining data from OV Bureau (trips database), Municipalities (customers database) and Publiek Vervoer (customers database)

* Cost reduction is based on the following assumptions:

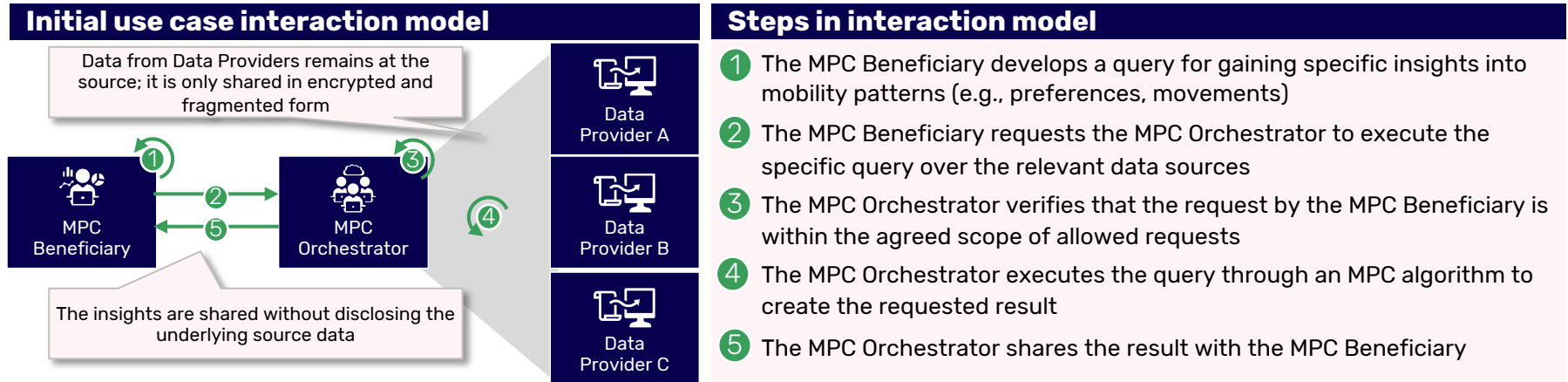
- Total #km WMO travellers ~4 mln km
- Costs WMO € 2/km
- Costs public transport € 0,2/km
- Potential migration WMO > PT 15% - 20%

Calculation:

$$✓ (0,15 * 4 \text{ mln}) * (2 - 0,20) = -1 \text{ mln EU}$$

¹Social support (Wet maatschappelijke ondersteuning, Wmo) from the Dutch government due to illness, disability or old age

Initial interaction model set for Publiek Vervoer, RL and other partners to gain (technical) experience with MPC



| Role | Description | MaaS actor in this case |
|-------------------------|---|---------------------------------------|
| Data Provider | An organisation with mobility related data | Publiek Vervoer, OV Bureau, Gemeentes |
| MPC Orchestrator | An organisation that facilitates MPC-based data collaboration | Roseman Labs |
| MPC Beneficiary | An organisation using insights from MPC | Publiek Vervoer |

Source: Data Sharing Coalition analysis

MPC is expected to deliver detailed insights for substantiating hypotheses on value potential in the 'Inclusief Reizen' pilot

Main hypothesis value potential pilot 'Inclusief Reizen'

Realisation of cost reduction and societal value by stimulating WMO-travellers to use public transport instead of WMO

MPC enables data collaboration to provide detailed insights in the results of the 'Inclusief Reizen' pilot to validate the hypothesis and analyse its impact

Sub hypothesis #1

Free/discounted public transport reduces total travel costs for municipality by [15-20%] given stable or increasing number of travel kilometres

➤ **Next analysis step:** Roll-out of free public transport for the target group throughout the region, without differentiation

Sub hypothesis #2

Free/discounted public transport is most effective for the [18-55 years], age category and less effective for the [55-80 years] category

➤ **Follow-up hypothesis:** Customisation of roll-out of free public transport for age group X results in an additional 5-10% cost reduction

Sub hypothesis #3

Free/discounted public transport is most effective in [urban] areas and less effective in [rural] areas

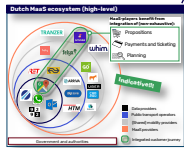
➤ **Follow-up hypothesis:** Customisation of roll-out of free public transport for group with characteristics Y results in an additional 5-10% cost reduction

Use case outcomes form a basis for additional value for other actors such as PTOs, MaaS providers and Mobility Operators

Work in progress!!!

The DSC team will conduct interviews and analysis for the scale up potential of the MPC for MaaS use case through:

1. Gaining insights in type of data owned per actor that through making available:
2. Develop new use case ideas as input for MPC MaaS roadmap that benefit other actors, for example:
 - Gain insights in end-to-end travel patterns by analysing trip and passenger data from multiple PTOs and mobility operators
 - Gain insights into future planning by analysing concession, route and trip data from transport operators and data providers



| Actor | Description | Data Owned by Actor | Expected barriers |
|-------------------------------------|---|---|------------------------------------|
| Public Transport Operators | Public agency responsible for providing a transportation service in a specific area | Trips, passengers, routes & timetables, etc | Commercial sensitivity and Privacy |
| Public Transport Authorities | Public authority which regulates or administers mobility related matters | Concessions, operator, etc | Commercial sensitivity and Privacy |
| Transaction Processors | Actor which processes fare payments and manages the automated fare collection system | Trips, passengers, etc | Privacy |
| MaaS providers | Operator which integrates various forms of transport services into a single mobility service accessible on demand | Trips, passengers, etc | Commercial sensitivity and Privacy |
| (Shared) Mobility operators | Providers of mobility services other than public transport (e.g. bike share, car rentals etc.) | Trips, passengers, etc | Commercial sensitivity and Privacy |
| Data providers | Actor which collects or provides data relevant to mobility (e.g. Municipalities, Statistics Netherlands, etc.) | Passengers, concessions | Privacy |

Source: Data Sharing Coalition analysis