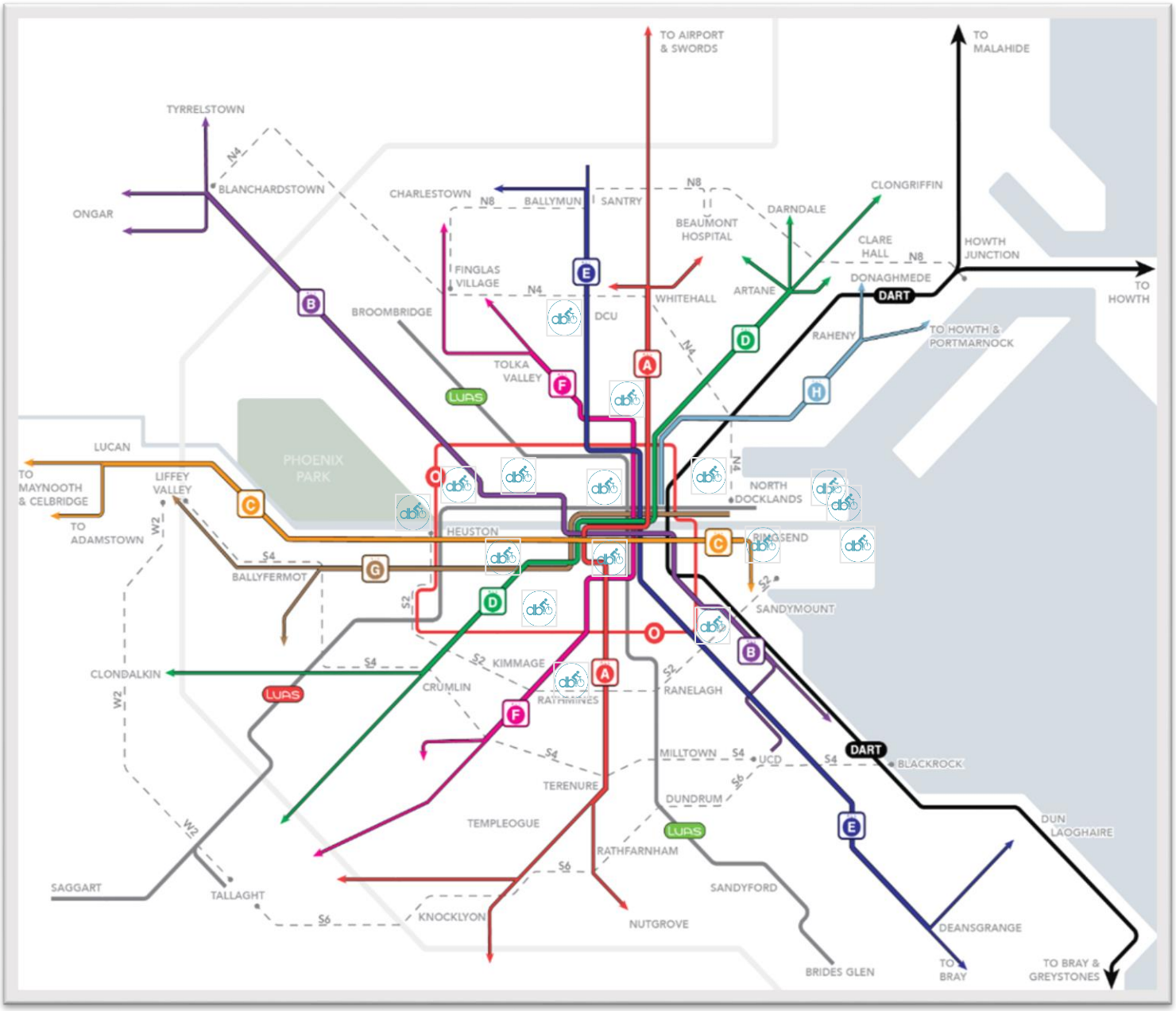
Recommendations to initiate a MaaS Programme in Dublin



November 2019


Open to all service providers
MaaS Advantages
High flexibility to monitor changes during the journey
Simplified user account and payment management
New business opportunities in the growing market
Convenient payment system
Door-to-door mobility
Provide / receive personalised transport services
Inclusive for all users
OPEN
New exploitation opportunities and markets for data analytics
SALES
Contribute to low-carbon transport and mobility
Choose your journey depending on the factors that matter to you
Receive real-time information on transport status
Access to new sales channels and untapped customer demand
Participate in the sharing economy
More effective policy-making as a result of improved insight into traveller needs
More efficient use of the transport system

Contents

1 Executive Summary

1.1 Purpose of Document

Mobility-as-a-Service (MaaS) is receiving a lot of attention in the Transport, Technology and Smart City arenas. Many strategy, playbook, and research documents exist however; there is a need for each city to evaluate what MaaS could look like considering the local context and future strategic challenges.

Smart Dublin has prepared this document for consideration by relevant stakeholders. It is a 'Point of View' at this moment in time with high-level recommendations to initiate a MaaS programme in Dublin.

1.2 Our Approach

This document collates relevant information to inform a way forward for Dublin acknowledging:

- The local driving forces demanding change in how people move around Dublin
- Key trends and lessons learned from international experiences
- The local stakeholder ecosystem

The information in this document has been gathered from reference visits/conference calls with relevant cities and targeted desktop research. Where appropriate, we have made direct reference to existing documentation to expedite the delivery of this document.

Before proceeding, we request the reader to first refer to the infographic on the inside cover page for a succinct yet comprehensive overview of the **expected benefits of MaaS[1].**

[1] *https://maas-alliance.eu/wp-content/uploads/sites/7/2018/03/ERT_MaaS_leaflet_FINAL.pdf*

1.3 What is MaaS?

The quotes below provide a good overview of how key organisations in this space would define MaaS. Common themes across the quotes include:

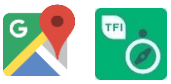
- Customer centric services
- Integration of all travel modes (public & private)
- Integration of Journey Planning plus Payment facilities
- Realistic alternative to car ownership
- A more efficient and effective way of matching supply to demand

2

[2] http://www.urbantransportgroup.org/system/files/general-docs/Urban%20Transport%20Group%20%E2%80%93%20Maas%20movement%20report_AW.pdf

1.3.1 Overview of MaaS integration levels

The diagram below helps define and position[3] MaaS in comparison to multi-model Journey Planning tools (e.g.) Google Maps, existing local public transport operator apps (e.g.) Dublin Bus, etc.

Mobility Integration Level	Description	Some Examples
Level 4	Goes beyond demand & supply (e.g.) city target to reduce congestion	Doesn't exist yet
Level 3	Multi-legs of trip. Bundling/subscription (PAYG, Monthly, Yearly)	
Level 2	Individual trip-find, book and pay	
Level 1	Multimodal travel planner, price information	
Level 0	No Integration	

We have used this Level Integration model for an 'As-is' assessment of Transport Apps in Dublin (see section 5.1. Key findings from this assessment are:

1. Level 1 is currently the highest level of integration in Ireland (i.e.) the user experience of existing apps is siloed.
2. User ratings are low for Public Sector Apps versus Private sector apps.
3. There is a user desire for personalisation capabilities (from reviewing comments on Google Play Store/Apple Store).

[3] https://www.researchgate.net/publication/330958677_Mobility-as-a-Service_and_changes_in_travel_preferences_and_travel_behaviour_a_literature_review

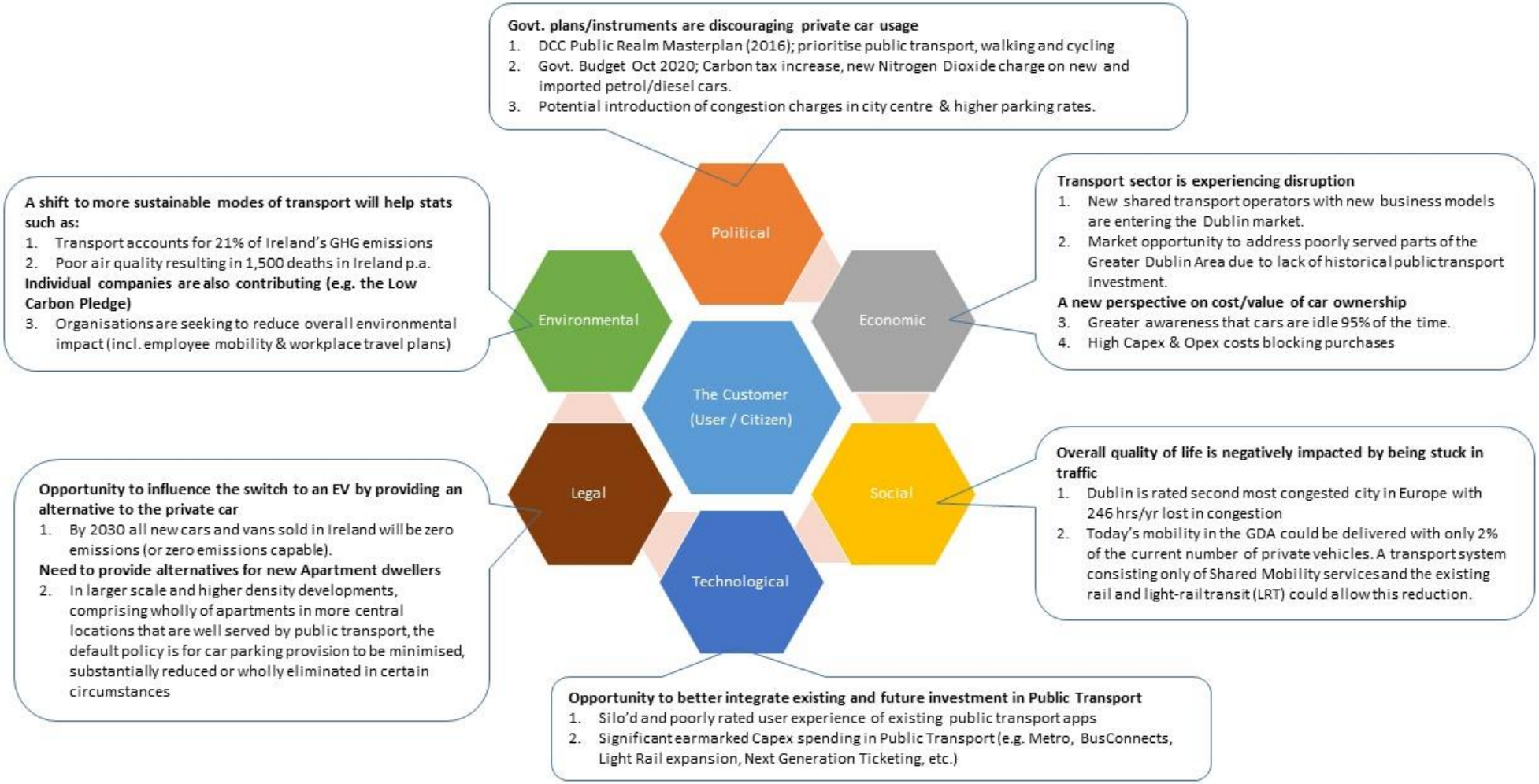
1.4 Why do we need to change how people move around Dublin?

The diagram below outlines a selection of **local** driving forces demanding change in how people move around Dublin. The drivers are categorised according to PESTLE categorisation identifying the factors at City and National level affecting the transport customer in Ireland. MaaS is not the silver bullet to address these forces but can play a material contributory role …

"A fully comprehensive MaaS offer could mean that ownership of private vehicles is no longer necessary for more people and customers' mobility needs are instead provided by a range of services through a single platform: usership replaces ownership[4]."

References to supporting documentation underpinning each of the PESTLE points is provided in section 5.2.

[4] http://www.urbantransportgroup.org/resources/types/reports/maas-movement-issues-and-options-mobility-service-city-region-transport


Govt. plans/instruments are discouraging private car usage
1. DCC Public Realm Masterplan (2016); prioritise public transport, walking and cycling
2. Govt. Budget Oct 2020; Carbon tax increase, new Nitrogen Dioxide charge on new and imported petrol/diesel cars.
3. Potential introduction of congestion charges in city centre & higher parking rates.
Political
A shift to more sustainable modes of transport will help stats such as:
1. Transport accounts for 21% of Ireland's GHG emissions
2. Poor air quality resulting in 1,500 deaths in Ireland p.a.
Individual companies are also contributing (e.g. the Low Carbon Pledge)
3. Organisations are seeking to reduce overall environmental impact (incl. employee mobility & workplace travel plans)
Environmental
Transport sector is experiencing disruption
1. New shared transport operators with new business models are entering the Dublin market.
2. Market opportunity to address poorly served parts of the Greater Dublin Area due to lack of historical public transport investment.
A new perspective on cost/value of car ownership
3. Greater awareness that cars are idle 95% of the time.
4. High Capex & Opex costs blocking purchases
Economic
The Customer (User / Citizen)
Opportunity to influence the switch to an EV by providing an alternative to the private car
1. By 2030 all new cars and vans sold in Ireland will be zero emissions (or zero emissions capable).
Need to provide alternatives for new Apartment dwellers
2. In larger scale and higher density developments, comprising wholly of apartments in more central locations that are well served by public transport, the default policy is for car parking provision to be minimised, substantially reduced or wholly eliminated in certain circumstances
Legal
Overall quality of life is negatively impacted by being stuck in traffic
1. Dublin is rated second most congested city in Europe with 246 hrs/yr lost in congestion
2. Today's mobility in the GDA could be delivered with only 2% of the current number of private vehicles. A transport system consisting only of Shared Mobility services and the existing rail and light-rail transit (LRT) could allow this reduction.
Social
Technological
Opportunity to better integrate existing and future investment in Public Transport
1. Silo'd and poorly rated user experience of existing public transport apps
2. Significant earmarked Capex spending in Public Transport (e.g. Metro, BusConnects, Light Rail expansion, Next Generation Ticketing, etc.)

1.5 Has MaaS worked in other cities?

MaaS is a new concept, hence it is somewhat early days to determine if expected benefits are being realised globally. Whilst many cities are 'doing' MaaS projects, it appears that quantifiable outcomes have only been reported for a handful (e.g.) Helsinki, Gothenburg, Vienna and Manchester.

Our view - overall, the statistics present broadly positive outcomes arising from MaaS activities in shifting customer behaviour to more shared and sustainable modes of transport.

It is worth noting, when examining report outcomes, the local context in each city, needs to be acknowledged, such as:

- Existing customer attitude towards public transport and usage
- Quality and variety of transport services available
- Existing levels of private car ownership & car dependency

1.5.1 Helsinki

The Whimpact report[5] by Ramboll Consulting was commissioned by MaaS Global to study the data gathered by the MaaS provider for one year (2018). Key findings on the Whim project include:

1. 95% of Whim-trips are made by public transportation.
2. 68% of all Whim trips occur in areas with the highest public transport access.
3. Whim users are avid multimodalists, using both bicycles and taxis to solve the first/last mile problem.
4. Whim users use 2.1 times more taxis than the typical Helsinki resident. If the use of taxis fulfils the needs of personalized mobility, it also reduces the parking demands in cities.
5. Users are adhering to range limits as per pricing model - with pricing, MaaS users can be influenced towards more sustainable modes of transportation.

Report conclusions

1. MaaS does not change the transport system itself; rather, it facilitates a more dynamic and inclusive use of existing one.
2. Relevant information presented in a user friendly way encourages uptake.
3. If users would switch from owning a car to making trips predominantly with public transportation, and cycling and walking more, as well as occasionally with taxis, ultimately this would decrease the car ownership, vehicle mileage, and need for parking.

1.5.2 Outcomes for other cities

A report by the Urban Transport Group[6] provides statistics for Gothenburg and Vienna as outlined in the table below.

	Gothenburg	Vienna
	UbiGo	**Smile**
Target Group	195 users	1,000 users
Timeline	6 months	2 years
% who reduced their private car usage	48%	21%
% who increased their Public Transport usage	50%	48%

[5] https://ramboll.com/-/media/files/rfi/publications/Ramboll_whimpact-2019.pdf
[6] http://www.urbantransportgroup.org/resources/types/reports/maas-movement-issues-and-options-mobility-service-city-region-transport

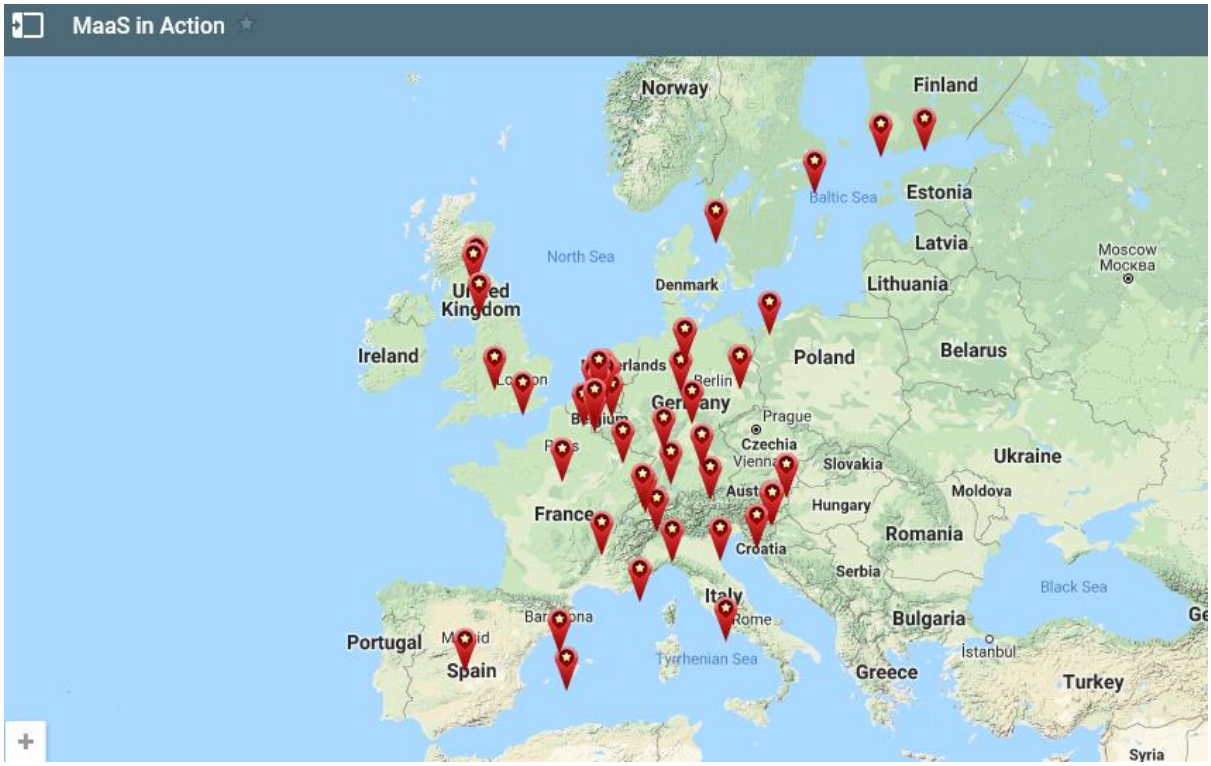
	Gothenburg	Vienna
% who increased their car sharing usage	57%	Not given
% who increased bike share usage	Not given	10%
% who increased their taxi usage	20%	7%
Other notes	97% of participants wanted to keep using the service(App) after the pilot project	Intermodality increased with 26% of users increasing public transport use in combination with private car.

Other notable statistics in the same Urban Transport Group report includes those for the Manchester trial in Oct. 2017 with 39 users:

- 21% of participants were now more willing to use active travel following the trial.
- 26% were more willing to use public transport.
- Six months after the trial, 82% of participants wanted MaaS to come back.

1.5.3 Overview of MaaS projects in Europe

Many European cities are performing MaaS related projects. See link here for an interactive map of MaaS projects in action: [https://maas-alliance.eu/maas-in-action/.](https://maas-alliance.eu/maas-in-action/) It would be good to put Dublin on the map.



1.6 What if we do nothing?

In the smart city space, we are seeing a wide variety of opportunities arising from the technology sector helping re-imagine how a city can function. These opportunities also present risks in how they are deployed in the public realm. We believe that Government needs to play a custodian role to ensure such smart city technologies are deployed in a strategic and orderly way and primarily for societal benefit.

If we do nothing in the MaaS space in Dublin, there is a high probability that disruption in the transport sector will happen anyway without direction/control by Govt. stakeholders with possible negative societal impacts. The Private-Led model outlined in section 2.1 touches on this scenario. In addition, the experience in New York is worth highlighting, key quotes from the Citylab article 'Walled Gardens' vs. Open Mobility: The Battle Begins'[7] include:

"For makers of city transportation policy, the conflict between Lyft and (New York) Transit raises some serious questions. One is whether a mobility service provider like Lyft should be able to leverage taxpayer-subsidized bikeshare systems to fortify the walled garden within its app. Another is whether—and how—cities should help residents easily plan and book trips across all available companies and services. After all, if Lyft succeeds in blocking Transit from unlocking bikeshare systems, it's hard to see how another third-party MaaS provider like Whim or Citymapper could gain access in the future."

"If cities are serious about reducing car trips and making multimodal travel as easy as possible, they'll want to remove the "friction" that frustrates those jumping between apps to find and book a trip."

1.7 Key Recommendations

Based on broadly positive international experiences, the risks associated with doing nothing, and our understanding of known operating models, we propose the following key recommendations as next steps:

1. **Formally initiate a MaaS programme**
   A MaaS programme should be initiated by a consortium of the relevant public bodies (e.g.) one or more of the NTA/Smart Dublin/TII/DTTAS, etc. Other key stakeholder such as Irish Rail, Dublin Bus, Transdev, private sector, etc. can be part of the programme as and when required. A key role for definition will be regulation of the MaaS service components, which could align to existing responsibilities such as:
   - NTA – overall control of public transport ticketing and taxis
   - Local Authorities - control of by-laws for car-clubs, bike sharing, parking rules, micro-mobility, etc.

   See section 1.8 for a first draft of a Dublin stakeholder map.

2. **Perform an Impact Assessment on existing or planned projects**
   We are mindful that there are projects planned or underway across the relevant stakeholders, in particular, the Next Generation ticketing project at the NTA. Assuming this document helps initiate a formal MaaS programme, each stakeholder should perform a high-level impact assessment as to how a Public-Led MaaS solution will affect their project(s).

[7] *Citylab - 'Walled Gardens' vs. Open Mobility: The Battle Begins*

3. **Perform a MaaS readiness assessment**

   Engage a service provider to perform a readiness assessment to implement a MaaS solution. This activity would work backwards from the 'end-game' to identify the building blocks needed to deliver a MaaS solution and the status of these building blocks locally. In compiling this paper, we have identified parties who could provide this service. This assessment must identify the most suitable operating model for Dublin however; this paper expresses on upfront opinion that a Public-Led model is preferred and should be led by the public authorities. Supporting rationale for choosing this model versus alternative models is outlined in section 2.2.

   Aside - any initial concerns over public authorities' capability to deliver the model should be considered separately from the strategic choice of model for Dublin.

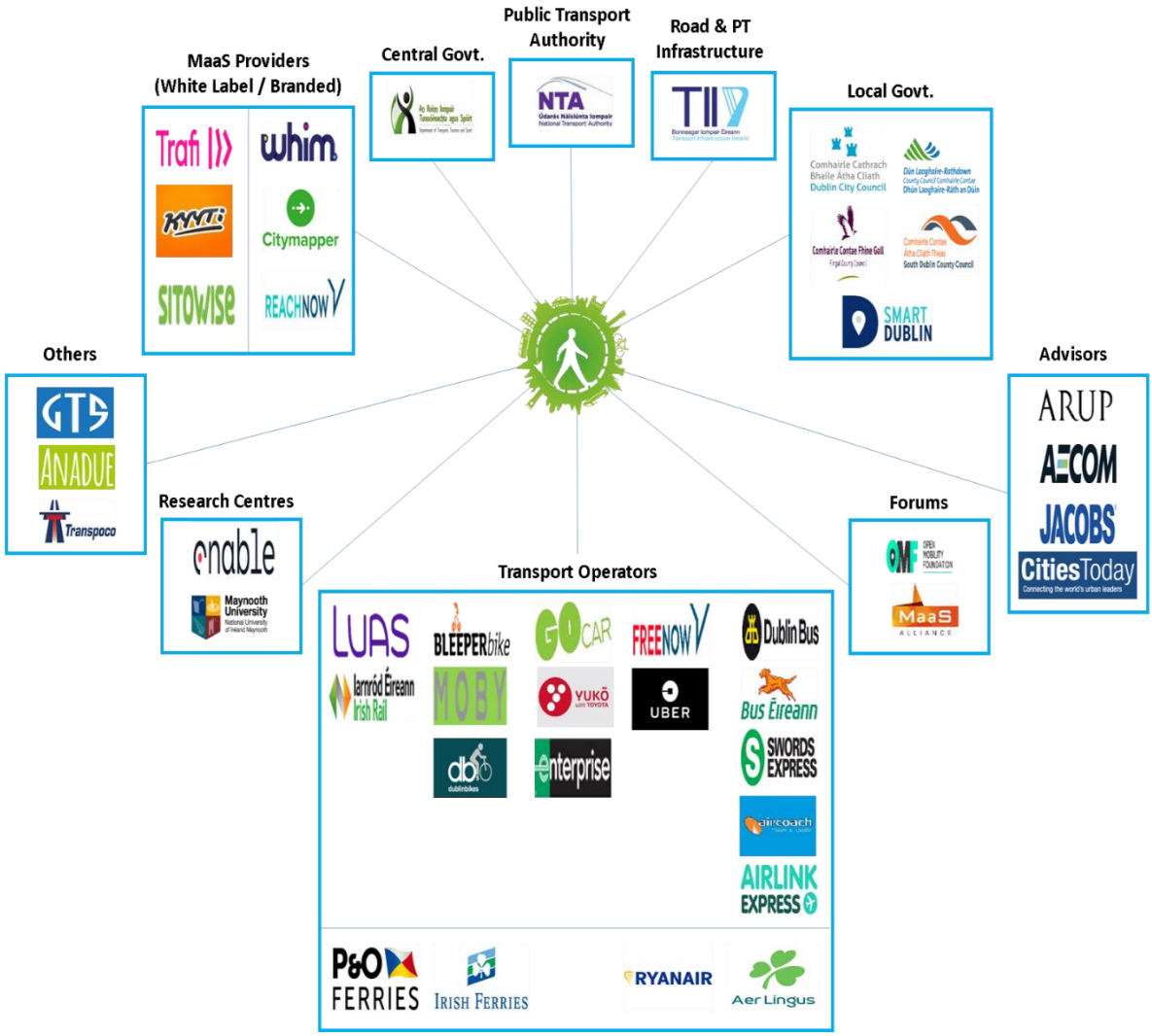
4. **Trial a MaaS solution (learn by doing)**

   Our As-Is assessment of relevant transport apps in Dublin (section 5.1) highlights low scoring for public sector led apps in contrast to high scoring apps from the private sector. The newly formed MaaS programme should engage with white label MaaS solutions to trial a solution(s) for Dublin rather than a bespoke build. Furthermore:

   a. Market sounding can help shortlist potential solutions.
   b. Trials can be de-risked by reducing the scope (e.g.) focus on:
      - A small cohort of users (e.g.) staff from all four Local Authorities, Dublin City Council staff only, NTA staff only, DCU or UCD staff/students, etc.
      - A small geography (e.g.) Sandyford business district, Docklands, etc.
      - Integrating a small number of transport operators (public/private)
   c. There is a variety of public innovation procurement processes available to underpin this trial process to allow procurement of the most suitable solution at the end of the trial.
   d. Initiate customer engagement activities (e.g.) focus groups, survey, develop initial communications and public information materials.

1.8 Stakeholder Map for Dublin

The diagram below provides a first view on relevant existing local stakeholders plus possible new actors based on our research. A Dublin MaaS programme will need to consult with each of these stakeholders to understand their perspective on a Public-Led MaaS initiative plus how they can add value to the programme. It is worth highlighting that the User (the centre icon) will also be a key stakeholder requiring engagement.



Building trust amongst stakeholders

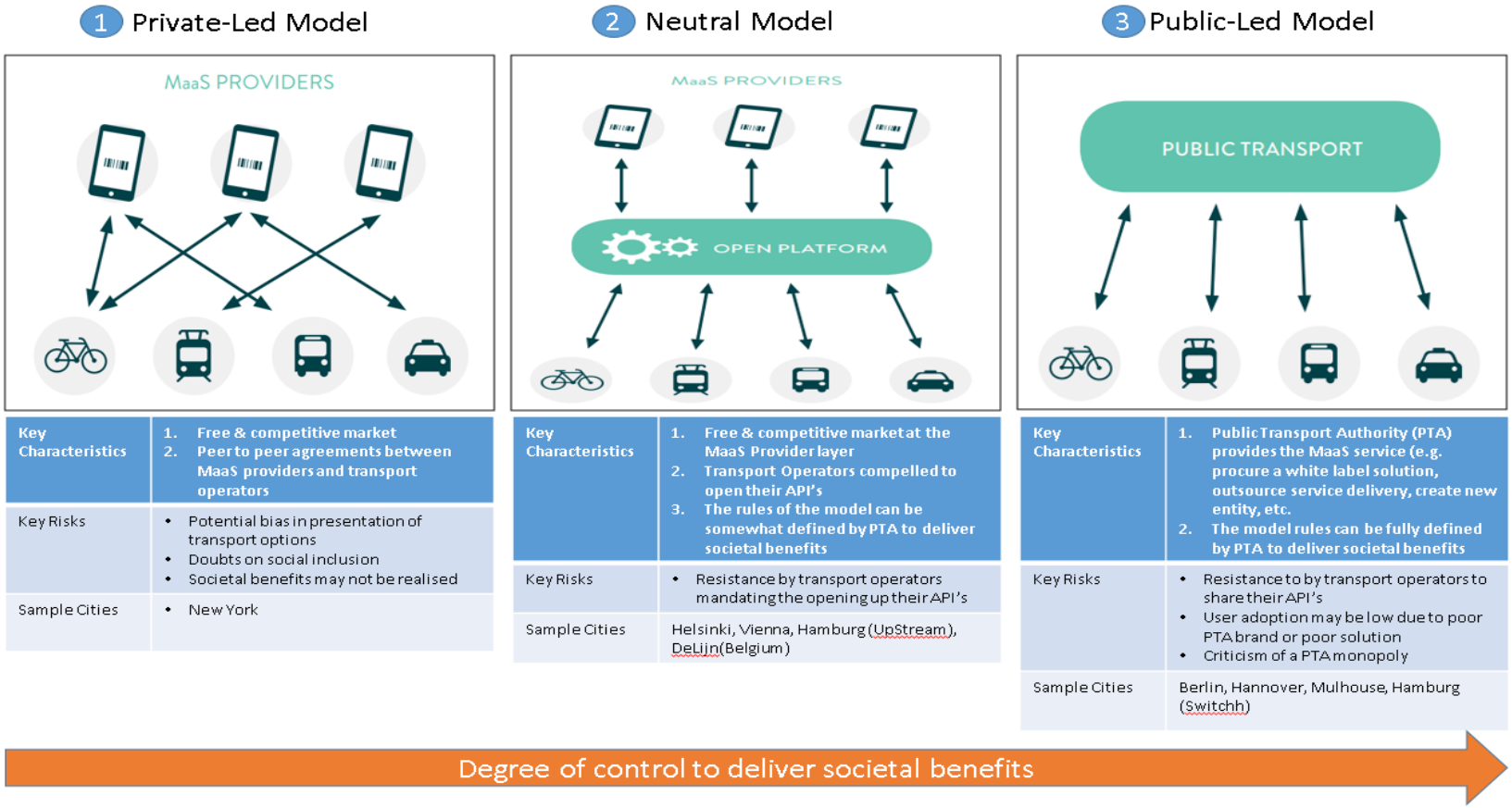
According to an Intelligent Transport article[8], **trust** is one of the top five factors in creating successful MaaS systems. It is important for stakeholders and passengers alike that the same assurances exist in MaaS as when owning a car. Knowledge of how to resolve problems, find necessary alternatives, and access MaaS in unknown territories, must exist. However, it is not only a case of trust between user and mobility provider; trust must also exist between the different mobility stakeholders. Without common understanding of regulation, ownership and individual responsibilities, MaaS will not succeed.

[8] *Intelligenttransport.com - top-five-factors-in-creating-successful-maas-systems*

2 Operating Models & Accelerators

2.1 Typical Operating Models

The diagram below outlines three MaaS models[9] (with key characteristics and risks) which are typically deployed in various cities globally. There may of course be variants of these models identified for Dublin upon further discussion.



Key Characteristics	1. Free & competitive market 2. Peer to peer agreements between MaaS providers and transport operators
Key Risks	• Potential bias in presentation of transport options • Doubts on social inclusion • Societal benefits may not be realised
Sample Cities	• New York

Key Characteristics	1. Free & competitive market at the MaaS Provider layer 2. Transport Operators compelled to open their API's 3. The rules of the model can be somewhat defined by PTA to deliver societal benefits
Key Risks	• Resistance by transport operators mandating the opening up their API's
Sample Cities	Helsinki, Vienna, Hamburg (UpStream), DeLijn(Belgium)

Key Characteristics	1. Public Transport Authority (PTA) provides the MaaS service (e.g. procure a white label solution, outsource service delivery, create new entity, etc. 2. The model rules can be fully defined by PTA to deliver societal benefits
Key Risks	• Resistance to by transport operators to share their API's • User adoption may be low due to poor PTA brand or poor solution • Criticism of a PTA monopoly
Sample Cities	Berlin, Hannover, Mulhouse, Hamburg (Switchh)

[9] https://www.uitp.org/sites/default/files/cck-focus-papers-files/Report_MaaS_final.pdf

2.2 A Public-Led model is recommended for Dublin

We believe a Public-Led model is the most suitable model for Dublin. We believe the MaaS service in Dublin should be led by public authorities for the following reasons:

1. The Public-Led model offers the most control for public authorities to define the rules to deliver societal benefits (e.g.) encourage active lifestyles, social inclusion, increase public transport patronage, reduce congestion, impartiality of information, etc.
2. Public transport is the backbone of any MaaS service. The existing public transport operators are the core provider and custodians of information about public transport travel & ticketing with established customer relationships. These operators should not give up this strategic role to the private sector.
3. Stakeholder buy-in to the programme should be easier as:
    a. The NTA has centralised oversight over the key public transport operators and can use this position to gain buy-in from the public operators.
    b. New private transport providers should be more inclined to integrate to a Public-Led service as opposed to a Private-Led service. Anecdotal feedback from other city experiences backs this up.
4. Benefits of MaaS for the public authorities include:
    a. Full visibility of data up & down the Value Chain (see section 2.3.1).
    b. Offers an opportunity to consolidate existing customer facing services (Apps) (see section 5.1) into an integrated service.
    c. Presents an opportunity for public authorities to increase their revenue by enlarging their customer base and cross-selling services.

Any concerns over public authorities' capability to deliver/maintain the model should be separated from the strategic choice of model for Dublin, as the delivery of the model can be constructed in many ways, such as:

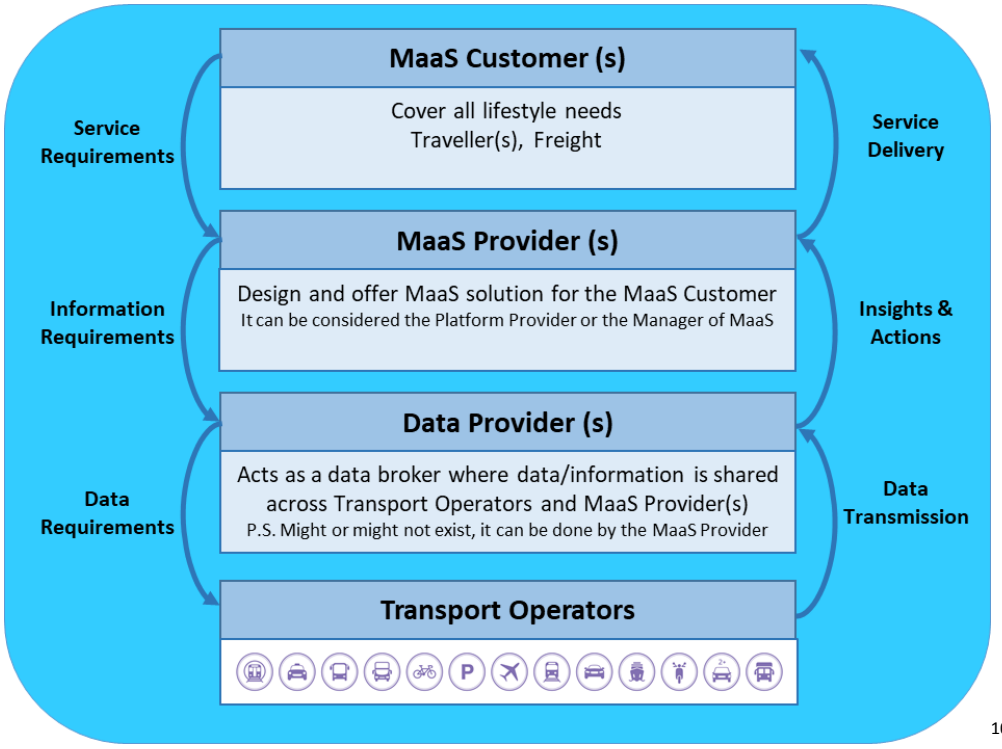
1. Full ownership of solution by public authorities
2. Public authorities act as a Commissioning Authority - outsource all responsibilities
3. Operational commissioning – authorities outsource a selection of responsibilities
4. Partnership – a partner is appointed by the public authorities to manage and operate the service

2.3 Accelerators

Accelerators to help expedite activities for the Dublin programme via our relationships with other cities, potential advisors to the programme, and collaboration forums such as the MaaS Alliance (see section 3.4). A key accelerator is a documented Value Chain.

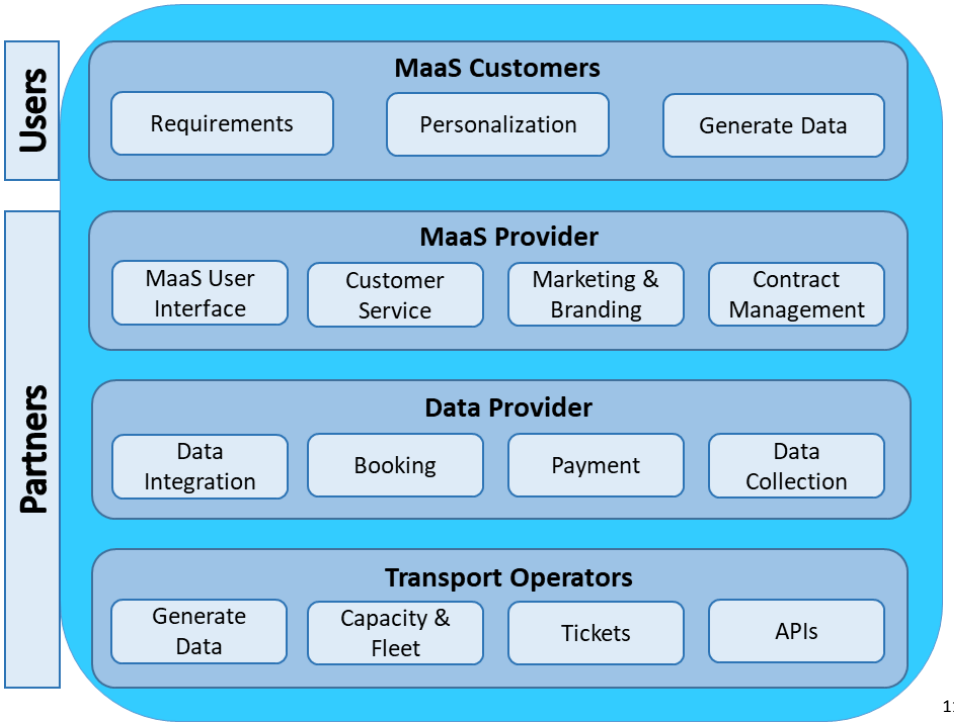
2.3.1 MaaS Value Chain

A value chain for MaaS typically has four layers as outlined below. It is important to ensure the activities of the Value Chain are clearly defined and ring-fenced; this clear segregation allows for any changes in responsibilities at a future date.



[10]

Within each layer of the Value Chain, the components of the MaaS solution are further expanded as per the diagram below:



[11]

2.3.2 Sample Design Principles

A first step for any Programme is to identify a set of Design Principles. An example for a MaaS programme is provided below from the MaaS Alliance.

[10] https://ts.catapult.org.uk/wp-content/uploads/2016/07/Mobility-as-a-Service_Exploring-the-Opportunity-for-MaaS-in-the-UK-Web.pdf
[11] http://spice-project.eu/wp-content/uploads/sites/14/2017/07/2-Sami-Sahala.pdf

Ecosystem open to all service providers and inclusive for all users (including people with reduced mobility or disabilities	Provide the best value for users on all their travel needs and to solve inconveniences of the journey. Offer options and let users choose best possible solution for door-to-door trips	Services providers should provide access to essential information in a digital format (e.g. timetables, routes, stops, prices and accessibility info). Ticketing and payment system should also be opened	MaaS ecosystem should be always based on mass transit and/or shared mobility services. Provide competitive alternatives to lead private car users to shift to public transport	The MaaS platform can support public authorities to improve the performance and services of the transport system, as MaaS success relies on existing factors, such as the quality of public infrastructure and physical assets. [12]

2.3.3 Data standardisation

One of design principles above is 'Data-driven and Interoperable'. Two accelerators/approaches are of interest on this topic:

1. ***Mobility Data Specification (MDS)*** – this specification was initially developed by the Los Angeles Department of Transportation (LADOT) to help manage dockless micro-mobility programs (including shared dockless e-scooters). MDS is comprised of a set of Application Programming Interfaces (APIs) that create standardized two-way communications for cities and private companies to share information about their operations, and that allow cities to collect data that can inform real-time traffic management and public policy decisions to enhance safety, equity and quality of life. More than 50 cities across the United States and dozens across the globe already use MDS to manage micro-mobility services. Smart Dublin has joined Open Mobility Foundation (OMF[13]) to leverage such specifications.
2. ***Mobility Catalogue***[14] - Lisbon sees the use of multiple third-party tools to create an overall MaaS system (not necessarily a single MaaS solution) as the key in solving local traffic, congestion and air pollution problems. Their catalogue will include essential mobility infrastructure data for use by third-party apps to improve their services and address blind spots (e.g.) include certain pedestrian ways or ensure the correct real-time traffic time estimations are used.

Aside – the public authorities should look to the above approaches to ensure robust data standards are part of any agreements/licensing with 3rd parties.

[12] https://maas-alliance.eu/wp-content/uploads/sites/7/2017/09/MaaS-WhitePaper_final_040917-2.pdf
[13] https://www.openmobilityfoundation.org/
[14] https://www.fleeteurope.com/en/smart-mobility/europe/features/lisbon-become-smart-maas-city?t%5B0%5D=Lisbon&t%5B1%5D=MaaS&t%5B2%5D=Fleet%20Europe%20Summit&curl=1

2.3.4 Sample Programme KPIs

A framework of KPIs based on two case studies in Sweden and Austria[15] is provided below which could be used to baseline and track the benefits realising from a MaaS trial (i.e.) to capture the 'before-and-after' snapshots.

Level	KPIs	Description of Possible Impacts	Possible Impact Areas
Individual	**Total Number of Trips**	Decrease or increase in total number of trips (people has better links so less trips done OR people who don't travel start doing it because is easier)	Environment / Social
	Modal Shift	Shift from private car to other transport modes (PT, sharing, etc)	Environment
	No. of Multimodal Trips	Trips completed using a combination of different modes of transport	Environment
	Atittudes	Change in behaviour towards PT, sharing mobility, etc.	Environment
	(Perceived) Acessibility to Transport	MaaS can increase acessibility to social services and be more inclusive	Social
	Total Travel Cost per Individual/Household	MaaS could decrease the total travel costs per individual and/or household (e.g. reduction on car ownership that stays most part of the time parked)	Economic / Social
Business / Organisational	**Number of Customers**	Shift from private car to other modes of transport	Economic
	Customer Segments	MaaS could attract other customer segments, with increase in number of customers in ther sectors (not only transport)	Economic / Social
	Revenues / Turnover	Revenues could increase or decrease depending upon how the streams of customers move	Economic
	Data Sharing	MaaS depends on data sharing and dissemination and further implementation relis on the collection and processing of data from different service providers	Economic
	Collaboration / Partnerships in Value Chain	Increase in collaboration between transport service providers (public and private) and possible creation of new roles in the value chain (e.g. Data Provider) or modifications on stakeholders roles	Economic
	Organisation Changes and Changes in Responsabilities	Organisational changes as result of MaaS	Economic
Societal	**Emissions**	Reduction in congestion, increase in greener transport modes	Environment
	Resource Efficiency	Better usage of roads, vehicles, land-use, etc	Environment / Economic
	Citizens Acessibility to Transport Services	Assure acessibility to all users, for all purposes, activities, services and coverage	Economic / Social
	Modification of Vehicle Fleet	Electrification, automation, etc	Environment
	Legal and Policy Modifications	Changes on regulations to assure MaaS ecosystem, society rights, etc	Environment / Economic / Social

[15] http://publications.lib.chalmers.se/records/fulltext/248829/local_248829.pdf

2.3.5 Five key questions to challenge our approach

The Urban Transport Group (UTP) suggest five fundamental questions[16] to ensure that a MaaS model delivers on urban public policy goals and how to engage with MaaS operators:

1. Does it incentivise public transport use?
2. Does it help reduce congestion and pollution?
3. Is it socially inclusive? (Is it affordable; accessible in a non-digital way; providing good geographical coverage; providing information and options for those with additional mobility needs?)
4. Is there a culture of openness and data sharing?
5. Does it encourage active lifestyles?

[16] *http://www.urbantransportgroup.org/resources/types/reports/maas-movement-issues-and-options-mobility-service-city-region-transport*

3 Selection of tips from our research

3.1 Mini-MaaS

Apart from citywide initiatives, large employer organisations are now looking at how their staff commute to work and move around during the working day. Employers are engaging with MaaS providers to understand how staff can be encouraged to shift their travel behaviour, which in turn can feed into the organisations carbon footprint remit. Such projects could be called 'Mini-Maas'. Locally, Dublin City, Dun Laoghaire-Rathdown and Fingal County Councils are providing Smart Mobility Hubs for their staff; a shared fleet of EV's, E-bikes and pedal bikes. Such shared mobility initiatives within an organisation feed into the wider MaaS ambitions for more sustainable mobility within a city.

3.2 Freight & Services

Whilst MaaS is meant mainly for passenger transport, opportunities exist to expand the scope to connect modalities for goods and services as well. Goods could be transported in special compartments of buses, trams or undergrounds. Trials in Finland are combining passenger journeys with journeys organised for health and social services, especially in more remote areas.

3.3 Mobility Hubs

The levels of MaaS integration are outlined in section 1.3.1. The integration of infrastructure (i.e.) the hardware to support the software (MaaS) is hugely important.

"Alignment and co-location of key transport hubs, fed by services that consider users' first and last mile approach along key movement corridors, can best achieve the aims of both MaaS and the transport system – to seamlessly, enjoyably and conveniently move people around the city and provide them the access that their lives require[17]."

As an example of mobility hubs, Hamburg is creating intermodal mobility hubs, Switchh points, around the city to ensure physical integration between the different transport modes. There are currently 45 Switchh points in the city[18].

The table below outlines best practice guidelines[19] as to what should be available at a mobility hub depending on the location of the hub:

- ***Neighbourhood Hubs*** are smaller ancillary station areas generally found in lower density neighbourhoods. They offer a few basic amenities essential to every transit area including wayfinding, bike share and bike parking.

[17] https://www.arup.com/perspectives/publications/promotional-materials/section/the-future-of-mobility-and-maas
[18] https://future.hamburg/en/project/switchh/
[19] http://www.urbandesignla.com/resources/docs/MobilityHubsReadersGuide/hi/MobilityHubsReadersGuide.pdf

- ***Central Hubs*** are typically located in a more urban context, and encompass one or more stations/bus stops. They offer many amenities in addition to the baseline features including car share, bus shelter, and next public transport information.
- ***Regional Hubs*** are the largest scale station areas in either dense urban areas or end of line stations where they connect to other regional transit providers. The regional hub offers the most amenities including secured bike parking and a bus layover zone along with important amenities and infrastructure built into the station itself.

Mobility Hub Amenities	Bicycle Connections			Vehicle Connections			Bus Infrastructure		Information–Signange			Support Services				Active Uses		Pedestrian Connections	
	2.1. Bike Share	2.2. Bike Parking	2.3. Bicycling Facilities	3.1. Ride Share/Pick up-Drop off	3.2. Car Share	3.3. EV Charging Stations	4.1. Bus Layover Zone	4.2. Bus Shelters	5.1. Wayfinding	5.2. Real-time Information	5.3. WI-FI / Smartphone Connectivity	6.1. Ambassadors	6.2. Waiting Area	6.3. Safety and Security	6.4. Sustainable Approach	7.1. Retail	7.2. Public Space	8.1. To the Mobility Hub	8.2. At the Mobility Hub
(N) Neighborhood	●	●	■	■	○	○	■	○	●	○	○	■	○	○	○	■	■	○	○
(C) Central	●	●	○	●	●	●	○	●	●	●	●	○	○	●	●	○	●	●	●
(R) Regional	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●	●	●
Legend:	Vital: ●			Recommended: ○			Optional: ■												

3.4 Collaboration Forums

To inform this document, Smart Dublin has joined:

- The MaaS Alliance; a public-private partnership creating the foundations for a common approach to MaaS.
- The Open Mobility foundation; an open-source software foundation, which creates a governance structure around open-source mobility tools, beginning with a focus on the Mobility Data Specification (MDS).

For the MaaS Dublin programme, we recommend active engagement with these forums to leverage guidelines and best practice wherever possible.

4 Concluding remarks

We believe this paper outlines:

1. The local driving forces demanding change in how people move around Dublin;
2. The broadly positive international experiences of MaaS;
3. The risks associated with doing nothing in Dublin, and;
4. A set of clear recommendations as to next steps for Dublin

We urge the relevant stakeholders to consider the recommendations and rationale presented in this document to initiate a MaaS programme in Dublin as soon as possible.

5 Appendices

5.1 Appendix – 'As-is' assessment of Transport Apps in Dublin

Basic Info			Essential Data/Tool					Secondary Data/Tool			Overview Customer Experience	
App Name	Organization	Mobility Integration Level	Journey Planner (door-to-door)	Multimodal	Real Time Information	Static Timetable	Fare Information	Booking	Payment	Personalisation Tools	Rating (0.0 - 5.0)	Customer Comments
National Journey Planner	TFI	Level 1	Yes	Yes	Yes	Yes	Yes	No	No	Yes (max. walking dist, transp. modes selection, favourites)	2.3 - 2.6	Positive: good timetable and ticketing info, real time info within 1 min accuracy, entire Ireland coverage, includes all transport modes (bus, train, tram, ferry), home/work planning tool. Negative: Late bus not reflected in the "real time info", app crashes, new update got worse, less user friendly.
Real Time Passenger Information	TFI	Level 1	No	Yes	Yes	N/A	N/A	N/A	N/A	Yes (history, favourites)	2.0	Positive: All transport in one app, save favourites, easy to use. Negative: Too many permissions requests, new update less user friendly and inacurate info, cancelled message meaningless.
Google Maps	Google	Level 1	Yes	Yes	No	No	Yes (only for taxi)	No	No	Yes (history, favourites, transp. modes selection, routes choice, connection modes)	4.3 - 4.7	Positive: heps finding routes, reliable map, navigation around entire world. Negative: problems with direction facing, icon of bus/tram/train is too similar, removal of some features on newest update (e.g. compass, interruption of music).
Moovit	Moovit	Level 1	Yes	Yes	No	No	No	No	No	Yes (languages options)	4.5 - 4.6	Positive: notifications of where to get off, works in different cities, very accurate, detailed and helpful info. Negative: no timetable, app crashes.
Dublin Bike 2Go	AltairApps	Level 0	No	No	Yes	Yes	No	No	No	No	4.5	Positive: service is good as last mile, shows bike paths, handy. Negative: update status slow.
Bleeperbike	Bleeperbike	Level 0	No	No	Yes	No	Yes	No	Yes	No	4.2 - 4.4	Positive: good coverage, dockless bike, PAYG option, cheap. Negative: unlocking system failures, problems ending trip, bike and GPS position inacurrate, consume a lot of battery running all the time in background, slow and sometimes poorly maintained.
Dublin Bus	Dublin Bus	Level 0	No	No	Yes	Yes	Yes	No	No	Yes (favourites, events synchronized)	1.9 - 3.1	Positive: does what meant to do, helps to don't miss a bus. Negative: need to find bus stop number, do not allow trip planning, problems at peak times, "ghost bus", some routes/stops doesn't have info available, no route maps, info not accurate.
Next Bus Dublin	Stephen McBride	Level 0	No	No	No	No	No	No	No	Yes (favourites)	3.6 - 4.6	Positive: has routes Dublin Bus app doesn't, most of the time accurate, tracking bus, alert when close, integrates two bus companies in Dublin, user friendly. Negative: mainly about inaccurate info that comes from TFI, no routes suggestion or integration with other transport modes.
Irish Rail	Irish Rail	Level 0	No	No	Yes	Yes	No	No	No	No	2.1 - 2.4	Positive: mostly accurate, shows changes, timetables. Negative: not compatible with newer android, basic planner, can't book tickets, no filtering, too many permissions (e.g. calendar, photo).
LUAS	LUAS	Level 0	No	No	Yes	Yes	Yes	No	No	No	2,1 - 3.3	Positive: operation hours, estimated frequency, nice interface. Negative: no bus integration, shows stops not routes, unmatch info to info on stops, inacurate info, no integration to pay for park & ride.
Go Car	Go Car	Level 0	No	No	No	No	No	Yes	Yes	Yes (history)	2.4 - 3.4	Positive: fast registration process, unlock/lock vehicle .on app, many vehicles type option Negative: no filter options, requires more info on how to use, GPS location not accurate, DOB selection not user friendly.
Free Now	Moovel Group	Level 0	No	No	No	No	No	Yes	Yes	Yes (history, favourites)	4.4 - 4.8	Positive: car and driver description, prebook option, easy to use, follow taxi position on map option, different payment options. Negative: problem with GPS location accuracy, updates message when it is updated already, last minute cancellation, doesn't have customer service support in the app.
Leap Card Top-Up	TFI	Level 0	N/A	N/A	Yes (balance)	N/A	N/A	M/A	Yes	Yes (history, card saved)	2.5 - 2.9	Positive: time saver, easy, check balnce on screen, option to remember card and secure with pin is good. Negative: cannot unable to automatic be read by NFC, people having problems to use.
ParkingTag	Payzone	Level 0	N/A	N/A	Yes (time to expire credit)	N/A	No	N/A	Yes	Yes (reminder, auto top up)	2.1	Positive: avoid worries on carrying coins, easy top up and registration. Negative: no clear fees schemes, no on screen balance.

5.2 Appendix - footnotes supporting PESTLE diagram (section 1.4)

Political:

1. https://www.dublincity.ie/sites/default/files/content/Planning/PublicRealm/Documents/Public%20Realm%20Masterplan.pdf
2. http://www.budget.gov.ie/Budgets/2020/2020.aspx
3. https://www.esri.ie/system/files/publications/QEC2019SUM_SA_Lynch.pdf

Economic:

1. See stakeholder map (section 1.8) for an overview of traditional, new and potential operators in the Dublin transport ecosystem.

Social

1. http://inrix.com/scorecard/
2. https://www.itf-oecd.org/shared-mobility-dublin

Technological

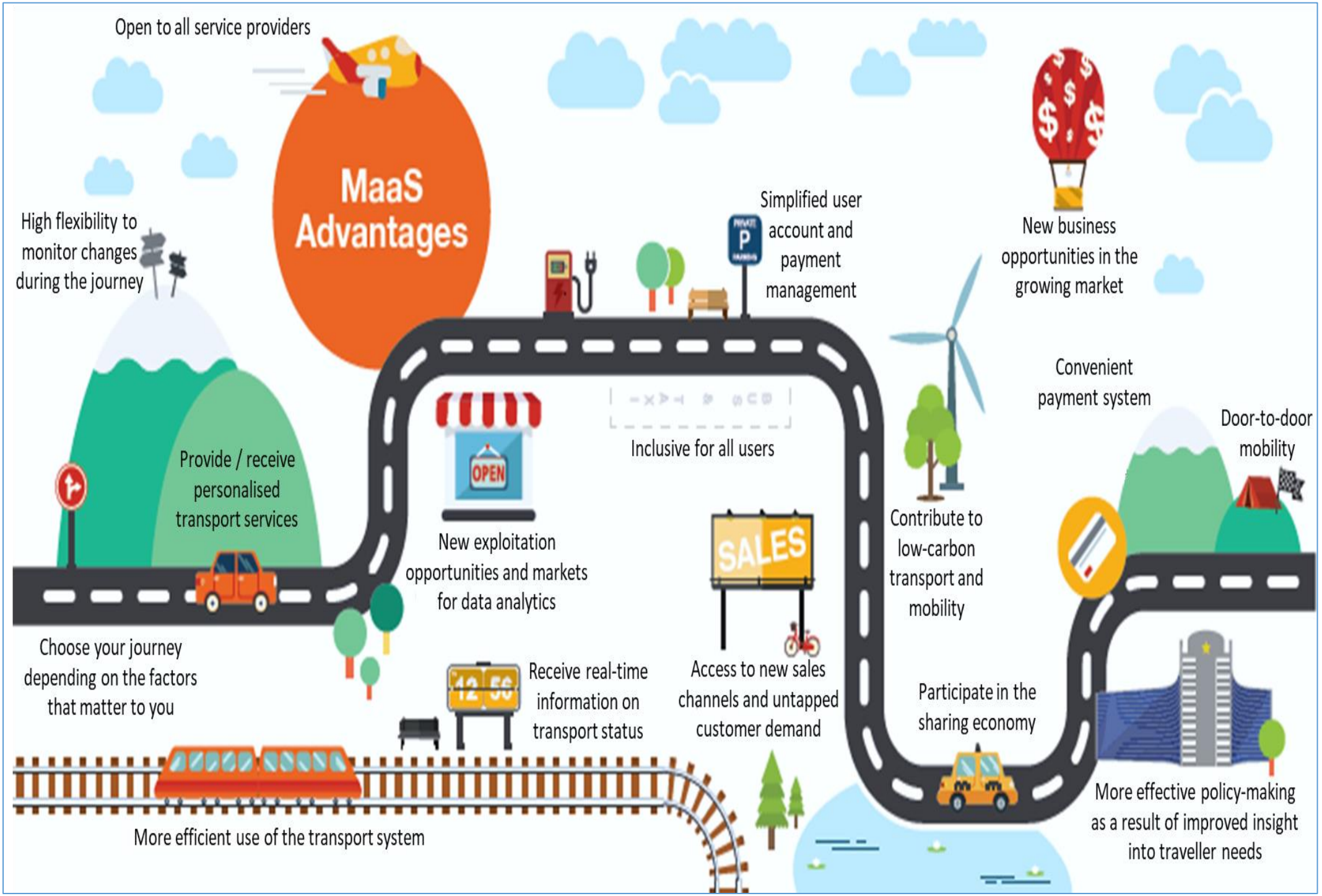
1. See the as-is assessment of local transport apps in Dublin (section 5.1) of this document.
2. https://www.gov.ie/en/campaigns/09022006-project-ireland-2040/

Legal

1. https://www.dccae.gov.ie/en-ie/energy/topics/Renewable-Energy/transport/electric-vehicles/Pages/Electric-Vehicles.aspx
2. https://www.housing.gov.ie/sites/default/files/publications/files/design_standards_for_new_apartments_-_guidelines_for_planning_authorities_2018.pdf

Environmental

1. https://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2018-2040/
2. https://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2018-2040/Greenhouse_Gas_Projections.pdf
3. https://www.bitc.ie/the-leaders-group/the-low-carbon-pledge/


Open to all service providers
MaaS Advantages
High flexibility to monitor changes during the journey
Simplified user account and payment management
New business opportunities in the growing market
Convenient payment system
Door-to-door mobility
Provide / receive personalised transport services
Inclusive for all users
OPEN
New exploitation opportunities and markets for data analytics
SALES
Contribute to low-carbon transport and mobility
Choose your journey depending on the factors that matter to you
Receive real-time information on transport status
Access to new sales channels and untapped customer demand
Participate in the sharing economy
More efficient use of the transport system
More effective policy-making as a result of improved insight into traveller needs