



Italian ITS Association



Multidimensional Indicator of MaaS systems Performance



jorgebandeira@ua.pt

PriMaaS | EWGT Presented at EWGT 2021

September 10, AVEIRO PORTUGAL

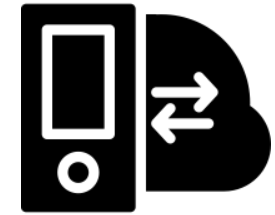
1. Motivation, Gaps and Objectives
2. Methodology
 - Concept
 - Evaluation Criteria
3. Results on selected MaaS systems
4. Concluding Remarks

PriMaaS Objectives

Create a knowledge center to support regions promoting the MaaS concept by ensuring that:

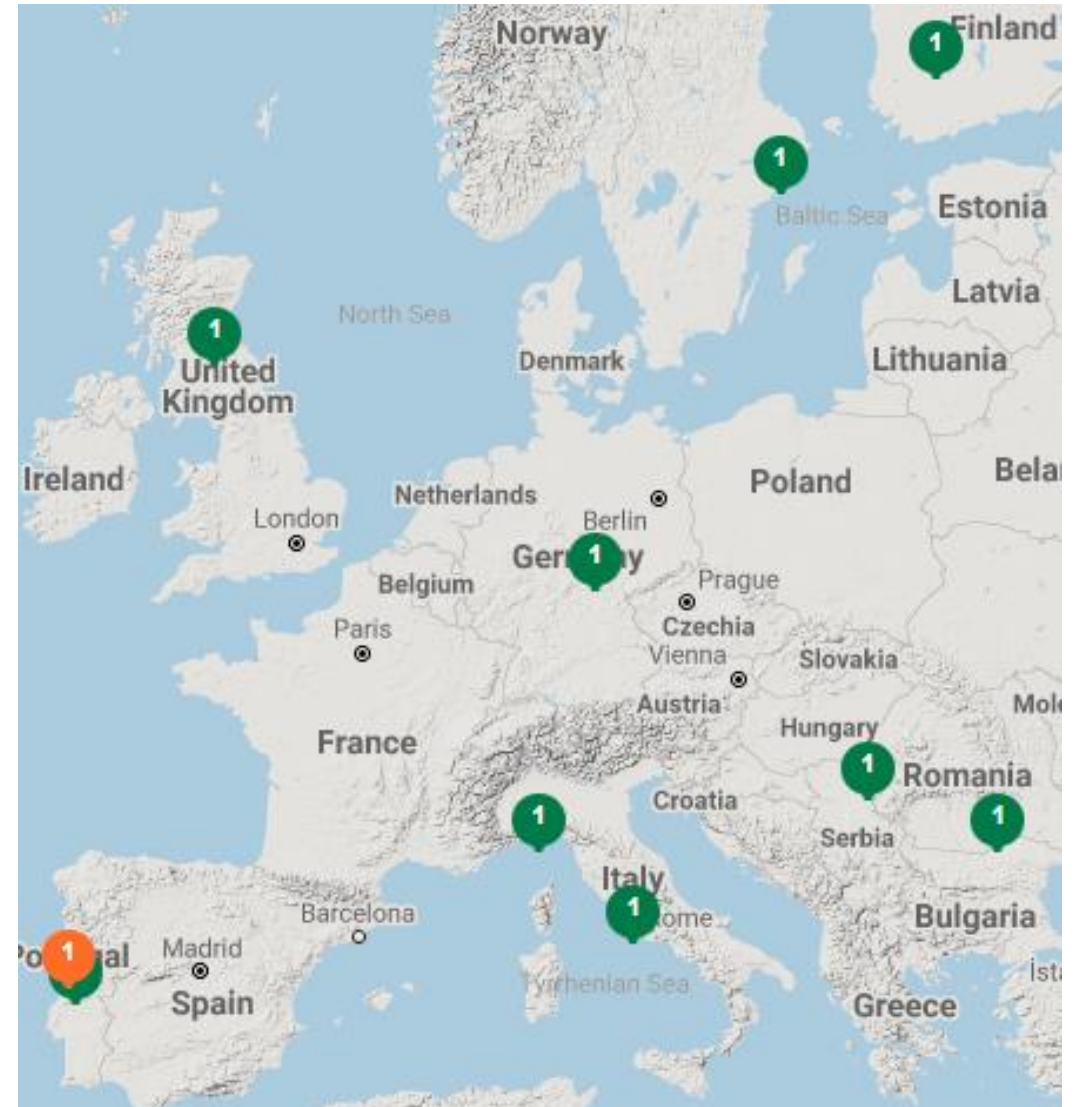
mobility solutions are focused on citizens' needs;

low-carbon mobility solutions are good choices from the citizen's point of view in terms of comfort and price.



Partnership

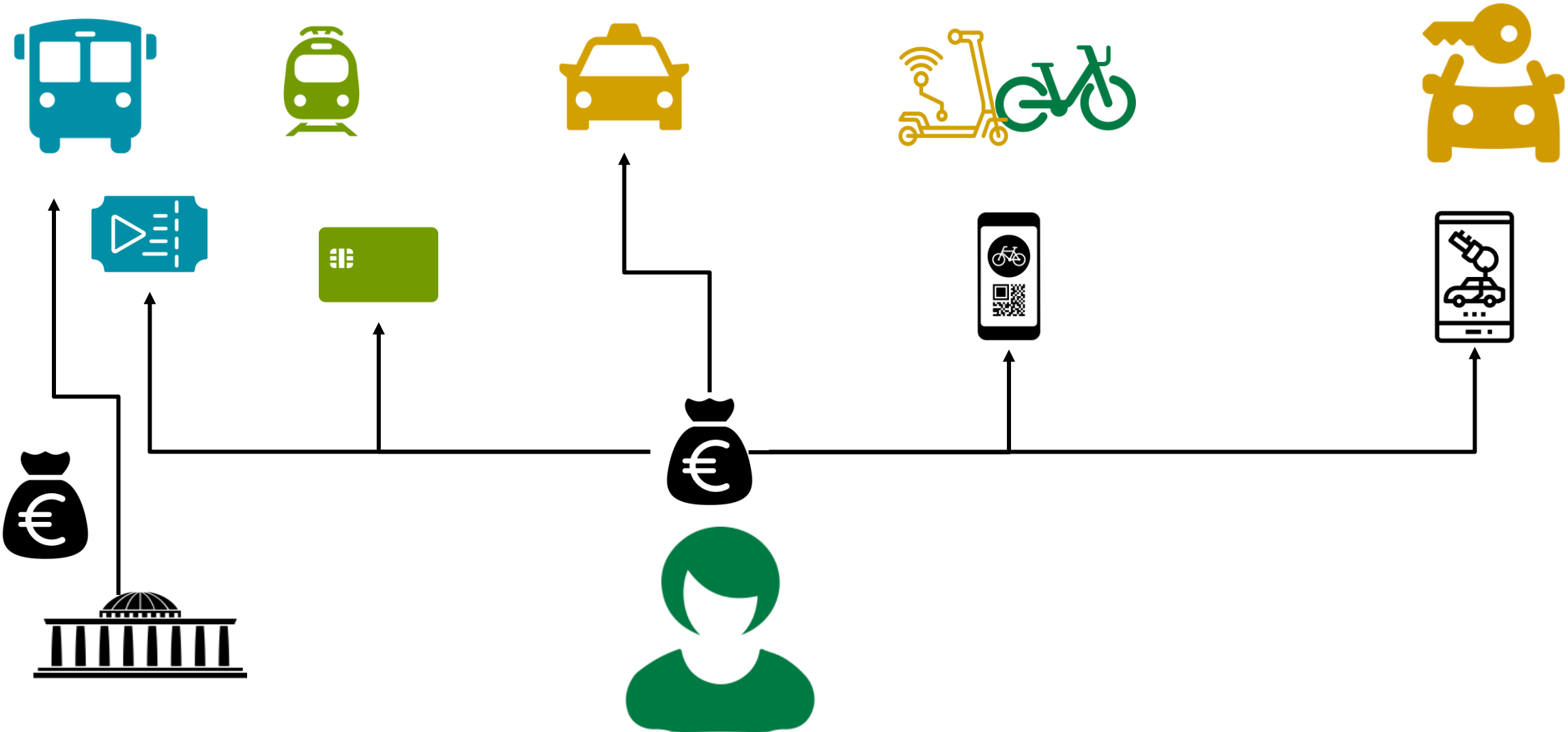
1. University of Aveiro (UA)
2. Intermunicipal Community of the Coimbra Region
3. TTS Italia
4. Intelligent Transport Systems Romania
5. University of Applied Sciences Erfurt
6. Timisoara Municipality
7. Liguria Region
8. eGovlab - Stockholm University
9. Council of Tampere Region
10. South East of Scotland Transport Partnership



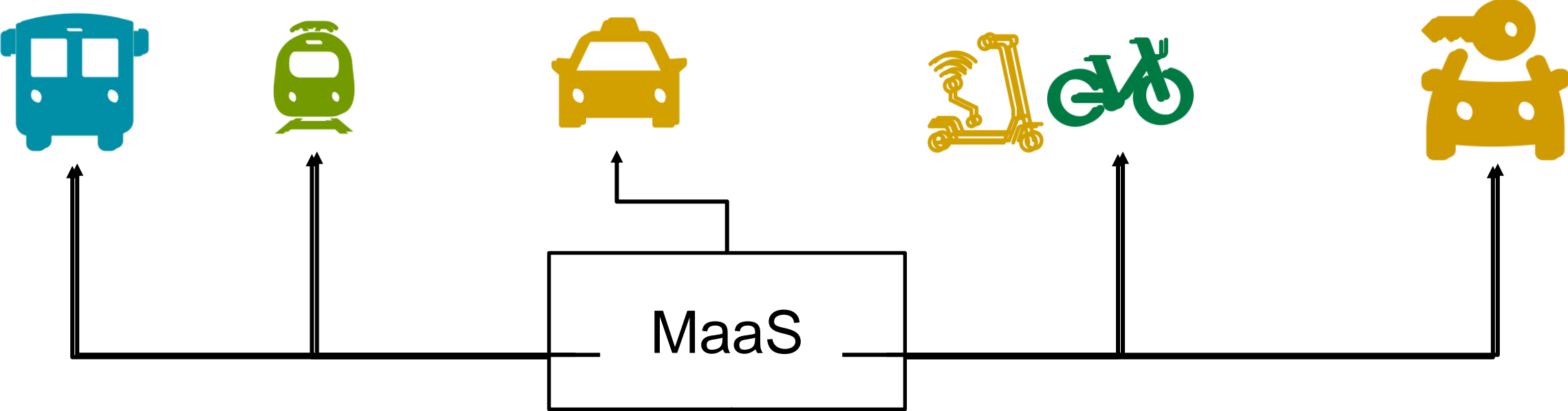
Mobility as a Service (MaaS) - promising approach to rearranging Mobility and contributing to reducing vehicle ownership

The MaaS vision is to consider "the whole transport sector as a cooperative, interconnected ecosystem, providing services reflecting customers' needs" (Hietanen, 2014).

No MaaS



Introduction



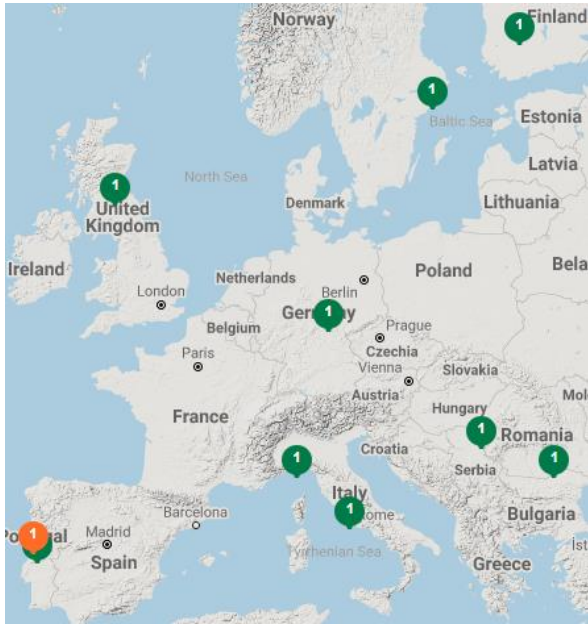
4	Integration of societal goals Policies, incentives, etc.	
3	Integration of the service offer Bundling/subscription, contracts, etc.	UbiGo whim
2	Integration of booking & payment: Single trip - find, book and pay	HANNOVERmobil smile einfach mobi
1	Integration of information: Multimodal travel planner, price info	moovit Aixxii Google
0	No integration: Single, separate services	e TRANSPORT FOR LONDON lyA FRITZ sunfleet



Coverage,
Environment,
Personalization,
Society ??

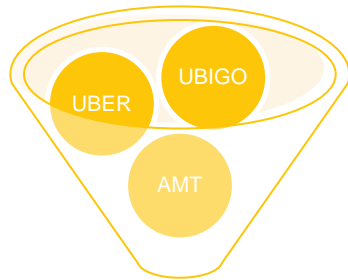
Existent classification systems

Reference	Classification System	Coverage (geographic and modes)	Functionality, integration of services, ICT	Contributions for sustainability
Kamargianni et al., (2016)	Ten levels (Transport modes (1 to 6) + 1 for ICT and mobility package integration)	1 point for each transport mode. No geographic coverage	Integration of services (planning, payment, booking). Focus on what is more appealing to travellers.	Not directly addressed.
Sochor et al. (2018)	Four levels 1-4	Possibility of adding layers of nuance, e.g. the number of modes - no clear assessment framework provided. No geographic coverage	Integration of functionality, from planning, ticketing, booking, and subscription. Focus on responsibilities and business models.	Integration of societal goals at level 4, but no clear assessment framework.
Lyons et al. (2019)	Six Levels 0-5	Some levels depend on the inclusion of more than one mode. There is no clear classification for geographic coverage	Integration in terms of operations degree of seamlessness, information, and transactions (i.e., booking, ticketing, and payment via one interface). Focus on the user perspective.	Not directly addressed in the evaluation framework.
Traffic Technology (2018)	Seven Levels (0-6)	Some levels depend on the inclusion of more than one mode. There is no clear classification for geographic coverage	Integration in terms of operations degree of seamlessness, information, data policy, and other smart city tools.	Not directly addressed in the evaluation framework.
This paper	Five levels * 6 categories	Framework assessment for geographic coverage and multimodality considering local context	Framework assessment for considering integration of services, technology, and personalization.	Framework assessment for considering the contribution to environmental and social pillars.



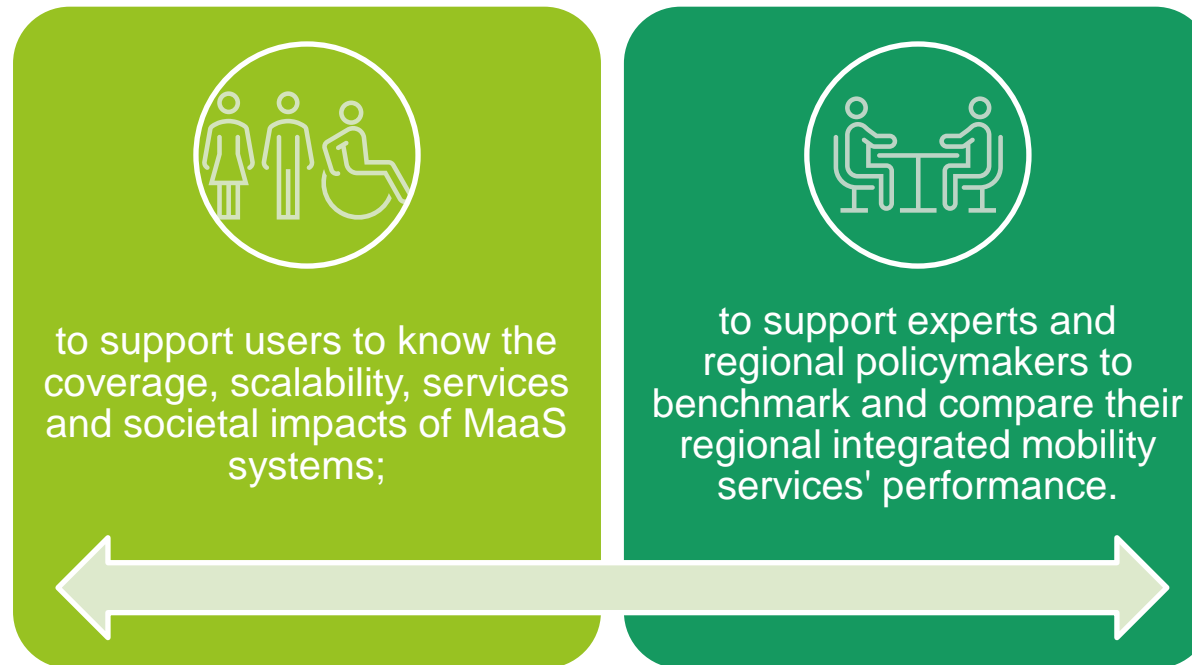
Existing topological frameworks for classifying the MaaS platforms offer relevant information about each system's functionality but, **neglect geographic, multimodal coverage**, and contributions for **sustainability are too vague**.

Difficult to establish a clear distinction between the **integration of services provided** and the **ease of use and personalization** of the platforms.

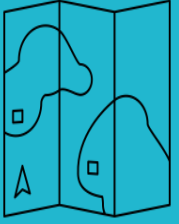







Coverage, Environment,
Technology etc ??

Why is needed to develop a multidimensional indicator?



Methodology – Main concept

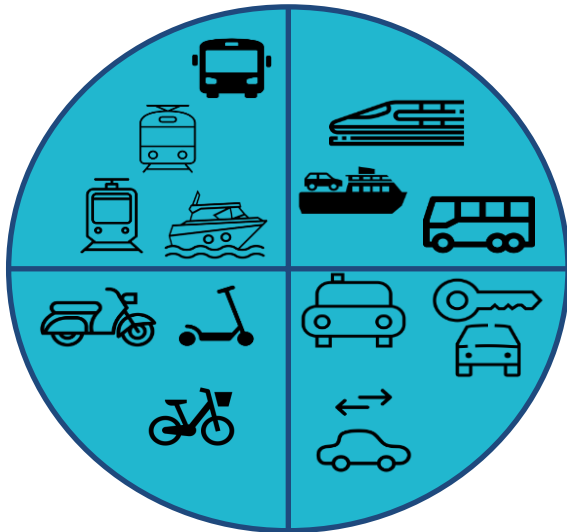
Coverage		Functionality		Sustainability	
					
Geographic area	Multi modality	Integration of services	IT personalization	Environmental policy	Social cohesion policy
5	4	2	1	2	3
4		1		2	
$(5+4+2+1+2+3)/30 = 0,5$					

Geographic area

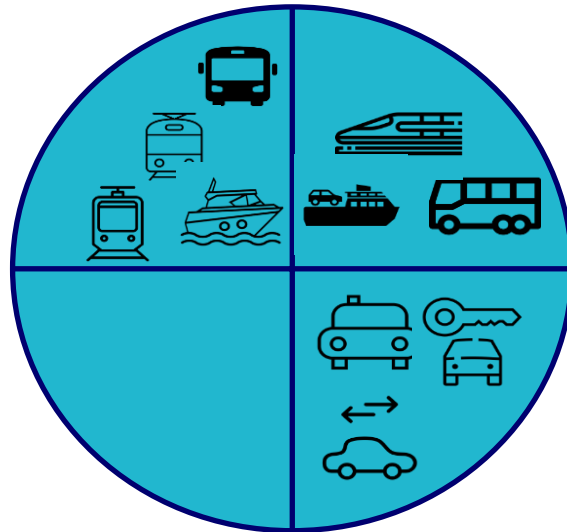
Ranking	Characteristics	Examples
1	Single Municipality	Erfurter Verkehrsbetriebe GmbH (EVAG)
2	Metropolitan Area	SL (Stockholm Public Transport), Navigogo
2	City + single longer distance PT service	DB-Regio
3	National Level	Resplus (via Samtrafiken) BlaBla car
4	Multiple discontinued cities/regions	Uber
5	Generalized cross border service	Flixbus, Google maps

- Services categories coverage

4 groups

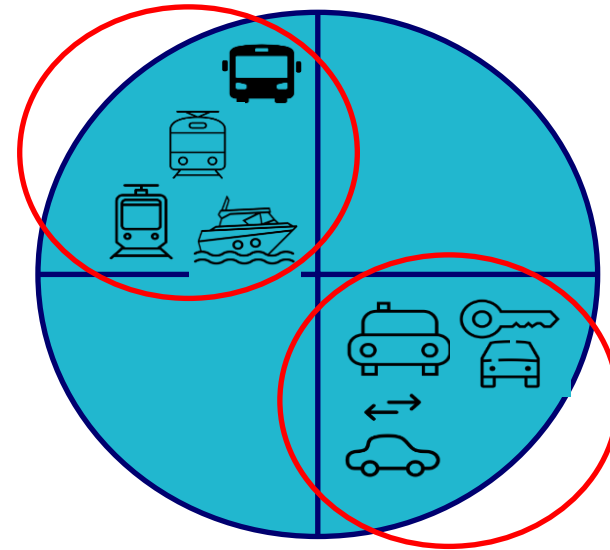


Regional Offer



3

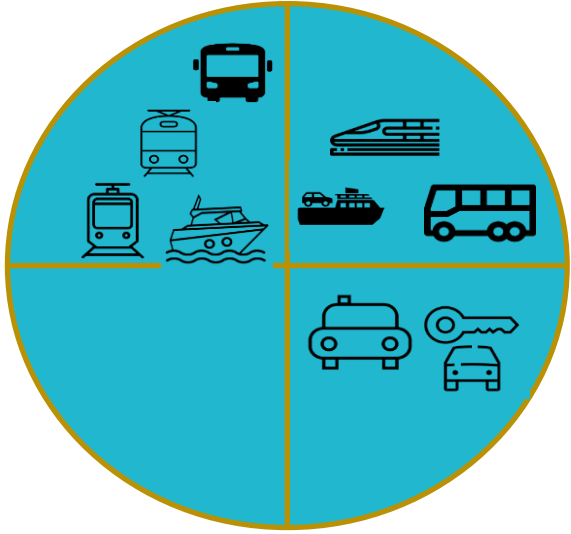
MaaS offer



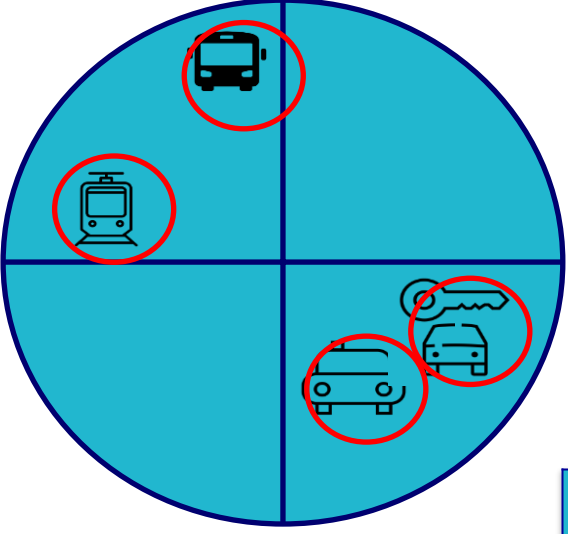
$2/3=0,66$



Services categories coverage



9



$4/9=0,44$

$$(0,44 + 0,66)/2 = 0,55$$



0,2	0,4	0,6	0,8	1
1	2	3	4	5



- Integration

IT & Personalization

Score	Characteristics	Example	Score	Personalization ^{IT}	Example
Yes +1, No 0	General Info	Aimo	Yes +1, No 0	App	EU-BIKE
Yes +1, No 0	Trip Planning	<u>Movit</u>	Yes +1, No 0	Voyage Customisation	orariotrasporti
Yes +1, No 0	Payment-Booking	<u>AMT Genoa</u>	Yes +1, No 0	Personalization	AMT
Yes +2, No 0	Bundling-Subscription	Ubigo, Navigogo,	Yes +1, No 0	Automated personalization	Google mpas
			Yes +1, No 0	IoT Integration	



Environmental contribution

Rank	Description	Example
1	Generic Environmental Information or strategic target	Tripshare SEStran
2	Customization Environmental Goals	Free Now
3	Gamification for promotion of Environmental goals	Navigogo
4	Active or Dynamic Pricing with environmental goals. Discounts for sustainable travel choices	MTR Express
+1	Integration with regional or urban planning strategies. Clear Evaluation Framework	Riviera Transport

Societal contribution

Rank	Description	Example
+ 1	Discounts for selected groups	Stockholm MTR Express, SMTUC (Coimbra)
+ 1	Data sharing	Uber, Whim
+ 1	Promoting disability independence	Uber Stockholm, AMT Genoa TPL Linea (Liguria), Moovit Scotland
+1	Promoting healthier lifestyles and livability	Nysse public transport (Tampere), STPT / Velo TM system (Timissoara)
+1	Improving the accessibility of low-density areas	Resplus (via Samtrafiken)



Results - Application

	Coverage		Functionality		Sustainability		Overall	Sochor et al., 2018	Transport Tech., 2018	Lyon et al., 2019
	Geo	Modes	Integration	Person	Environ	Social				
Whim (Helsinki, FI)	2	4	5	2	1	1	0,5	3	4	4
SWA Mobil (Augsburg, DE)	2	4	3	3	0	0	0,4	3	4	4
VMT App (Erfurt, DE)	2	3	3	3	0	0	0,37	2	4	4
DB Navigator (DE)	3	2	3	3	0	0	0,37	2	4	
Google Maps (Erfurt, DE)	5	3	2	4	0	1	0,5	1	0	1
Moovit (Coimbra, PT)	4	1	2	2	1	0	0,3	1	0	1
AMT (Genoa, IT)	2	4	3	3	1	3	0,6	3	3	4
Uber (Stockholm, SW)	4	1	3	3	2	1	0,4	1	NA	2
Ubigo (Stockholm, SW)	2	4	5	2	1	1	0,5	3	4	4
Resplus (Swdeen)	3	4	5	1	1	1	0,5	3	2	3
FreeNow (Timisoara, RO)	4	1	3	3	0	0	0,3	1	NA	2
Flixbus (International)	5	1	3	1	0	0	0,33	1	NA	2

- Future challenges for achieving a truly (and perceived) Sustainable MaaS :
 - Progressive and bi-directional convergence in terms of geographic coverage, integration of modes and services,
 - Ambitious vision and implementation of measures to promote green mobility and accessibility to all
 - Greater clarity in data sharing standards - upstream (mobility offer data that feeds MaaS systems) and downstream data (which aggregated demand data and with what granularity should be provided by the MaaS systems to public authorities);
 - Existence of transparent kpis in terms of modal distribution and average ecological footprint of the users of each MaaS service.
 - Need to better internalize transport's effects -> Critical thinking about MaaS and integration with wider urban objectives.

Role of regions and managing authorities

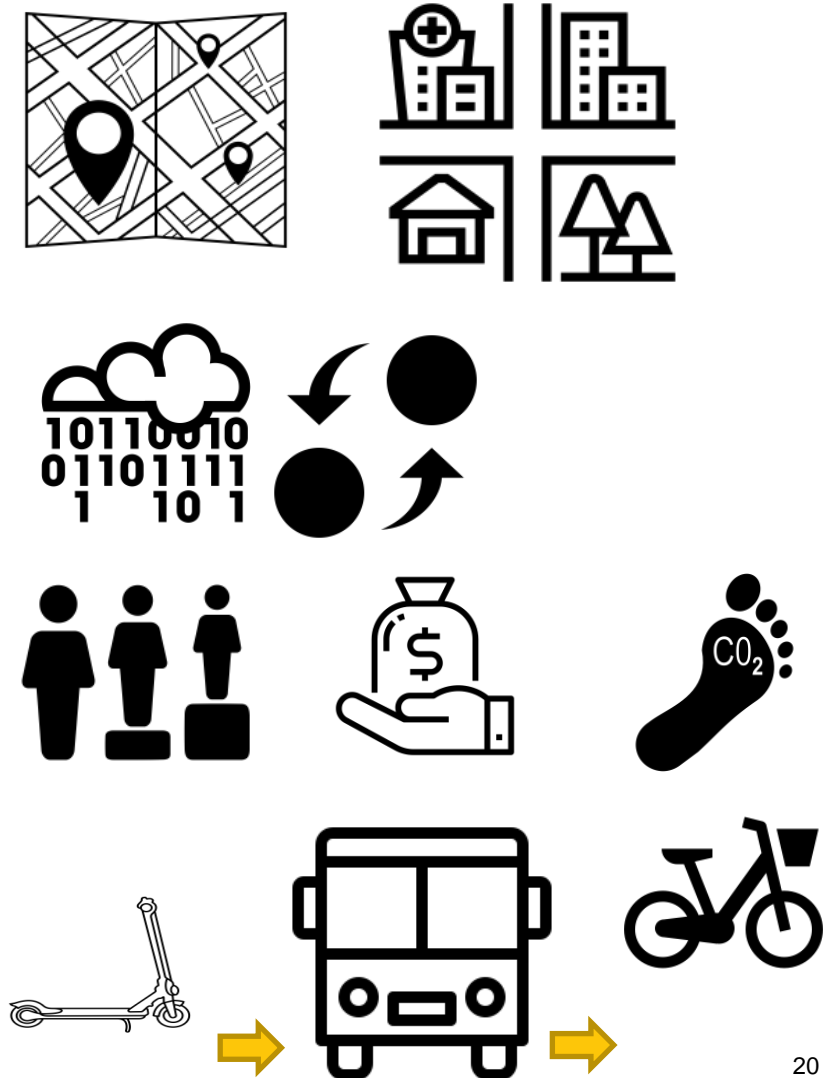
Promoting regional and interregional interoperability

Integration with strategic planning objectives

Promote trust and correct data sharing

Equitable and intelligent citizen subsidisation and more effective internalisation of external costs

Increase trust between operators and foster the mobility chain focused on public transport



Thank you
for your attention

Jorge Bandeira

Researcher

Centre for Mechanical Technology and Automation
Department of Mechanical Engineering - University of Aveiro
Campus Universitário de Santiago 3810-193 Aveiro, Portugal



jorgebandeira@ua.pt

<http://transportes-tema.web.ua.pt/>





PriMaaS

Interreg Europe

Thank you, Obrigado

<https://www.interregeurope.eu/primaas/>



jorgebandeira@ua.pt

Project smedia