Evaluation of MaaS Applications Based on Technical Aspects by Using MCDM-AHP Method

Author: Aldiyar Belossarov

Supervisor: Dr. Domokos Esztergar-Kiss
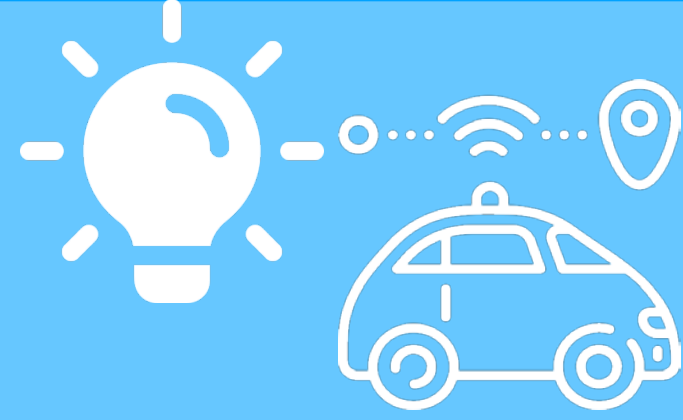
Digital Mobility

2008

ITS Action Plan

✓ Collaboration of different transport operators

✓ Promotion of multi-modal journey planners

✓ Boosting of shared mobility

Scientific publication

2014

Mobility as a Service - A Proposal for Action

✓ MaaS concept first scientific introduction

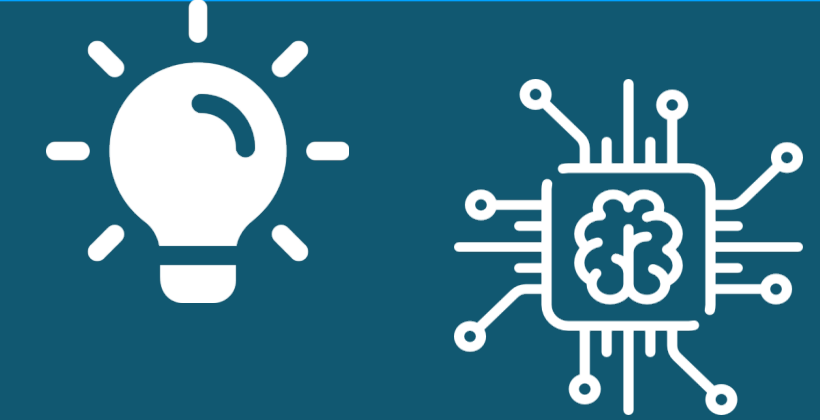✓ Seven main actions to implement MaaS

✓ 7th action – "Pilots and test areas"

MaaS organization

2016

MaaS Alliance

✓ Develop the concept of Mobility as a Service

✓ Integrate various stakeholders

✓ Spread the MaaS solutions"

MaaS development

2021

ERTICO
ITS EUROPE

POLIS
CITIES AND REGIONS FOR TRANSPORT INNOVATION

UITP
ADVANCING PUBLIC TRANSPORT

✓ Zero-emission Mobility for all – Mission for MaaS

✓ MaaS Alliance Suggestions for legislative and financial measures

✓ A fundamental transport transformation: Commission presents its plan for green, smart

Problem

Gaps in the MaaS development:

- Consideration of Key technical aspects in theory
- Year-by-year Increase of MaaS theoretical research database from the general perspective
- Lack of real and fully developed MaaS solutions on the market

"Do and Learn" approach necessity

Necessity of considering the real-world examples

ACTUAL

No evaluation and comparison of existing MaaS solutions

Research description

Statement

Discussing about the MaaS solutions and considering their main characteristics in theory is not enough, rather a quantified representation and a comparison opportunity of the MaaS applications are needed to identify main gaps and strong sides on real examples, in order to support future improvements and realizations of the MaaS concept.

Goal

Research aims to create a framework for the evaluation and comparison of the MaaS applications that is based on five key aspects of every MaaS solution identified as routing, booking, payment, ticketing, and supplementary services.

Main question

How to provide the quantified representation and comparison of the MaaS applications, which allows the detection of the weaknesses and strengths for the future development of the MaaS concept?

Methodology

1 Technical aspects

1. • Identifying of key technical aspects
2. • Identifying sub-aspects for each technical aspect
3. • Points distribution

2 MCDM-AHP technique

1. • Scoring (g_j) → **1** Technical aspects
2. • Weighting (w_{ij}) → **2** AHP expert survey
3. • Ranking → **3** $g_j * w_{ij}$

General Evaluation number

Weighted Evaluation number

Comparison

Results: Database of MaaS Market

Operational MaaS solutions	MaaS Platform	Stopped MaaS solutions	MaaS Platform
Compte Mobilité	Digital app	UbiGo (Goteburg)	Digital app
Moovizy	Digital app	Shift	Digital app
TaM	Digital app	Smile	Digital app
MobiPalma	Digital app	NordwestMobil/PostBUS	Digital app
CityTrips (RACC Trips*)	Digital app	Choice	Digital app
Whim	Digital app	RideMate	Digital app
My Cicero	Digital app	Comtrade	Digital app
Reach Now (Moovel*)	Digital app	UbiGo (Stockholm)	Digital app
VIA GoMobile	Digital app	Optymod	Digital app
Leipzig MOVE	Digital app		
Mobility Mixx	Digital app	Planned MaaS solutions	
WienMobil	Digital app	Umaji	Digital app
Moovit	Digital app	Kyyti	Digital app
Urbi	Digital app	HVV Switch	Digital app
Mozio	Digital app	NS	Digital app
Meep	Digital app		
TransitApp	Digital app		
Milo (XXImo)	Card		
STM (Communauto/Bixi)	Card		
Tim	Card		

As a result, 33 MaaS solutions are found during the data collection
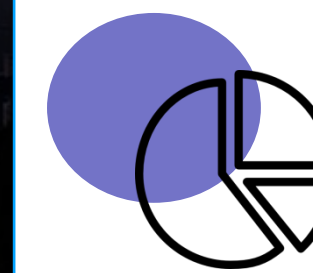
- 20 operate currently
- 9 are out of service
- 4 are planned to be started soon
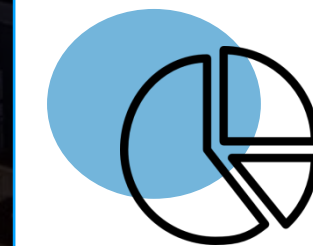
Results: Database of MaaS Market

Coverage	MaaS solution	Country	Penetration (Downloads)	Total Downloads
Urban	Compte Mobilité	France	5000+	905.000
Urban	Moovizy	France	50000+	
Urban	TaM	France	100.000+	
Urban	MobiPalma	Spain	100.000+	
Urban	VIA GoMobile	USA	100.000+	
Urban	Leipzig MOVE	Germany	50.000+	
Urban	WienMobil	Austria	500.000+	
National	CityTrips (RACC Trips*)	Spain	50.000+	1.201.000
National	Whim	Finland	100.000+	
National	My Cicero	Italy	500.000+	
National	Reach Now (Moovel*)	Germany	500.000+	
National	Mobility Mixx	Netherlands	1000+	
National	Meep	Spain	50.000+	
International	Moovit	EU	50.000.000+	5.515.000
International	Urbi	EU	100.000+	
International	Mozio	Worldwide	50.000+	
International	TransitApp	Worldwide	5.000.000+	

As a result, out of 17 operational MaaS solutions:

7 are operating in one city only

6 operating nationally

4 are operating worldwide

3 are card-type solutions

Results: Technical aspects

1

Key aspects

Routing	Booking	Payment	Ticketing	Supplementary

Sub-aspects

Routing	Booking	Payment	Ticketing	Supplementary
✓ Routing availability(5)	✓ Booking availability (5)	✓ Payment availability(5)	✓ Ticketing availability(5)	✓ User-oriented services(5)
✓ Vehicle position(1)	✓ Registration (1)	✓ Payment types(3)	✓ Ticketing type(3)	✓ Position (1)
✓ Dynamic information(1)	✓ Price information (1)	✓ Payment options(3)	✓ Validation(1)	✓ Alerts (1)
✓ Dynamic planning(1)	✓ Reservation (1)	✓ Discounts(1)		
✓ Comfort services(1)				

Points

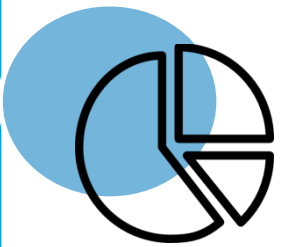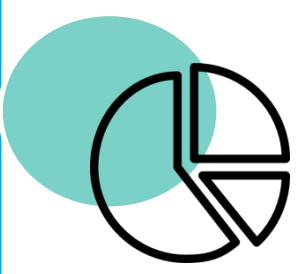| Routing	Booking	Payment	Ticketing	Supplementary
9	8	12	9	7

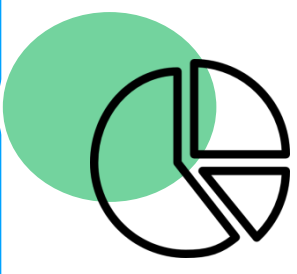Six matrices were created for the relative importance assessment:
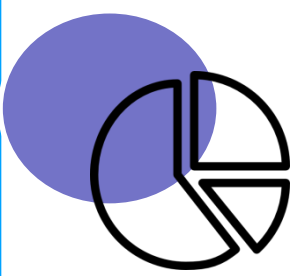
- 21 transport expert participated
- Global weights of key aspects were determined
- Local weights of sub-aspects were determined
- The most relative important aspects is Payment (29%)

Technical aspects	Weight per aspect	Sub-aspects	Local weights	Global weights
Routing	26%	Routing availability	11%	3%
		Vehicle position	18%	5%
		Dynamic information	29%	8%
		Dynamic planning	32%	8%
		Comfort services	10%	2%
Booking	16%	Booking availability	28%	5%
		Registration	19%	3%
		Price information	41%	7%
		Reservation	12%	2%
Payment	29%	Payment availability	32%	9%
		Payment types	14%	4%
		Payment options	32%	9%
		Discounts	22%	6%
Ticketing	23%	Ticketing availability	52%	12%
		Ticketing type	19%	4%
		Validation	29%	7%
Supplementary services	7%	User-oriented services	31%	2%
		Position	32%	2%
		Alerts	37%	2%

|	Compte	Mobilité (Moovizy)	TaM	MobiPalma	VIA	GoLA / GVH	WienMobil / Qixxit	RACC Trips	Whim	My Cicero	Moovel	Mobility Mixx	Meep	Moovit	Urbi	Mozio	TransitApp	Average	The level of achievement
Routing	**6**	**5**	**6**	**6**	**2**	**7**	**8**	**7**	**8**	**3**	**6**	**6**	**8**	**6**	**9**	**6**	**8**	**6,29**	**70%**
Routing availability	2	2	2	2	0	3	4	4	4	1	2	2	4	2	5	2	4	2,65	53%
Vehicle position	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0,88	88%
Dynamic information	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1,00	100%
Dynamic planning	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0,88	88%
Comfort services	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	0,88	88%
Booking	**4**	**2**	**1**	**2**	**2**	**6**	**4**	**3**	**6**	**2**	**7**	**4**	**5**	**0**	**0**	**5**	**6**	**3,47**	**43%**
Booking availability	1	0	0	0	0	3	1	1	3	1	4	2	2	0	0	2	3	1,35	27%
Registration	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0,88	88%
Price information	1	0	0	1	1	1	1	1	1	0	1	0	1	0	0	1	1	0,65	65%
Reservation	1	1	0	0	0	1	1	0	1	0	1	1	1	0	0	1	1	0,59	59%
Payment	**7**	**3**	**5**	**3**	**3**	**6**	**3**	**3**	**7**	**3**	**3**	**5**	**7**	**1**	**1**	**6**	**7**	**4,29**	**36%**
Payment availability	3	1	2	1	1	4	1	0	4	1	1	2	3	0	0	2	3	1,71	34%
Payment types	2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	2	1	1,00	33%
Payment options	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	3	1,18	39%
Discounts	1	0	1	0	0	0	0	1	1	0	0	1	1	0	0	1	0	0,41	41%
Ticketing	**2**	**2**	**2**	**3**	**3**	**3**	**3**	**0**	**4**	**2**	**4**	**3**	**3**	**0**	**0**	**2**	**3**	**2,29**	**25%**
Ticketing availability	1	1	1	1	1	1	1	0	2	1	1	1	1	0	0	1	1	0,88	18%
Ticketing types	1	1	1	1	1	1	1	0	1	1	2	1	1	0	0	1	1	0,88	29%
Validation	0	0	0	1	1	1	1	0	1	0	1	1	1	0	0	0	1	0,53	53%
Supplementary services	**3**	**4**	**4**	**2**	**1**	**4**	**5**	**2**	**6**	**3**	**3**	**0**	**5**	**5**	**2**	**2**	**5**	**3,29**	**37%**
User-oriented services	2	2	2	1	0	2	3	1	4	1	1	0	3	3	1	0	3	1,71	34%
Position	1	1	1	0	0	1	1	0	1	1	1	0	1	1	1	1	1	0,76	76%
Alerts	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	0,82	82%
Total Score	**22**	**16**	**18**	**16**	**11**	**26**	**23**	**15**	**31**	**13**	**23**	**18**	**28**	**12**	**12**	**21**	**29**	**20**	**44 %**
Achieved percentage	**49**	**36**	**40**	**36**	**24**	**58**	**51**	**33**	**69**	**29**	**51**	**40**	**62**	**27**	**27**	**46**	**64**	**%**	
Ranking	**7**	**11**	**9**	**11**	**17**	**4**	**5**	**13**	**1**	**14**	**5**	**9**	**3**	**15**	**15**	**8**	**2**		

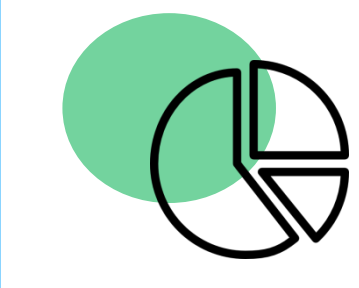According to General Evaluation of MaaS applications:
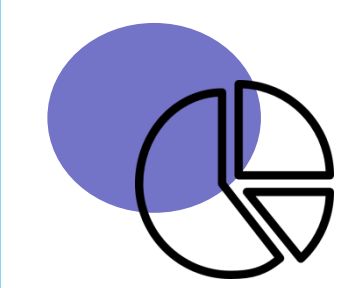
- Whim is the most efficient app (31 out of 45 points)
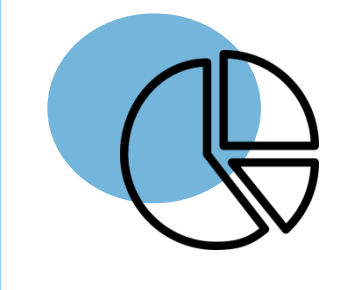
- The highest achievement level is 69 %
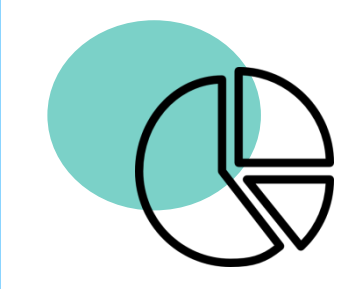
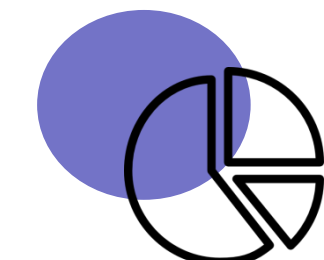- On average MaaS apps receive 20 points (44% from the possible)
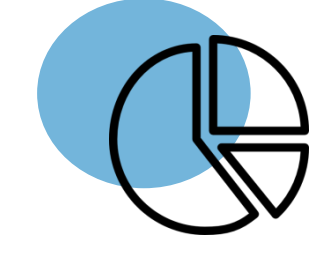
- Routing is the most elaborated aspect

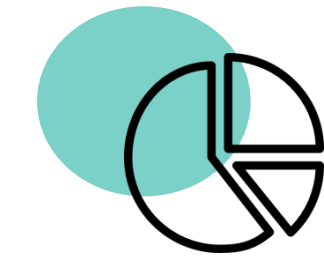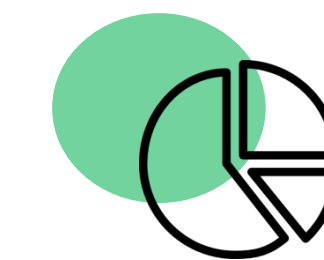| MaaS solutions	General evaluation number (g_j)	Ranking according to g_j	Weighted evaluation number (q)	Ranking according to q
Compte Mobilité	22	7	1,181	5
Moovizy	16	11-12	0,761	12
TaM	18	9-10	0,942	10
MobiPalma	16	11-12	0,878	11
CityTrips (RACC Trips*)	15	13	0,644	15
Whim	31	1	1,629	1
My Cicero	13	14	0,676	14
Reach Now (Moovel*)	23	5-6	1,143	6
VIA GoMobile	11	17	0,730	13
Leipzig MOVE	26	4	1,375	4
Mobility Mixx	18	9-10	1,030	9
WienMobil	23	5-6	1,063	8
Moovit	12	15-16	0,484	17
Urbi	12	15-16	0,502	16
Mozio	21	8	1,119	7
Meep	28	3	1,444	2
TransitApp	29	2	1,417	3

According to Comparison of MaaS applications:

- Changes are moderately significant (2-3 place change on average)

- ViaGoMobile shows the highest change

- Application with higher developed Payment services surpass the others

- Routing is the most elaborated aspect

Conclusion and Discussion

MaaS

- Routing
- Supplementary
- Booking
- Payment
- Ticketing

Highest importance (29%)

Most developed feature

Highest performance: Whim, Meep, TransitApp

Implementation and stoppage of MaaS solutions

Lowest performance: Moovit, Urbi, City Trips
Only 44% of full potential is achieved by MaaS solutions on average
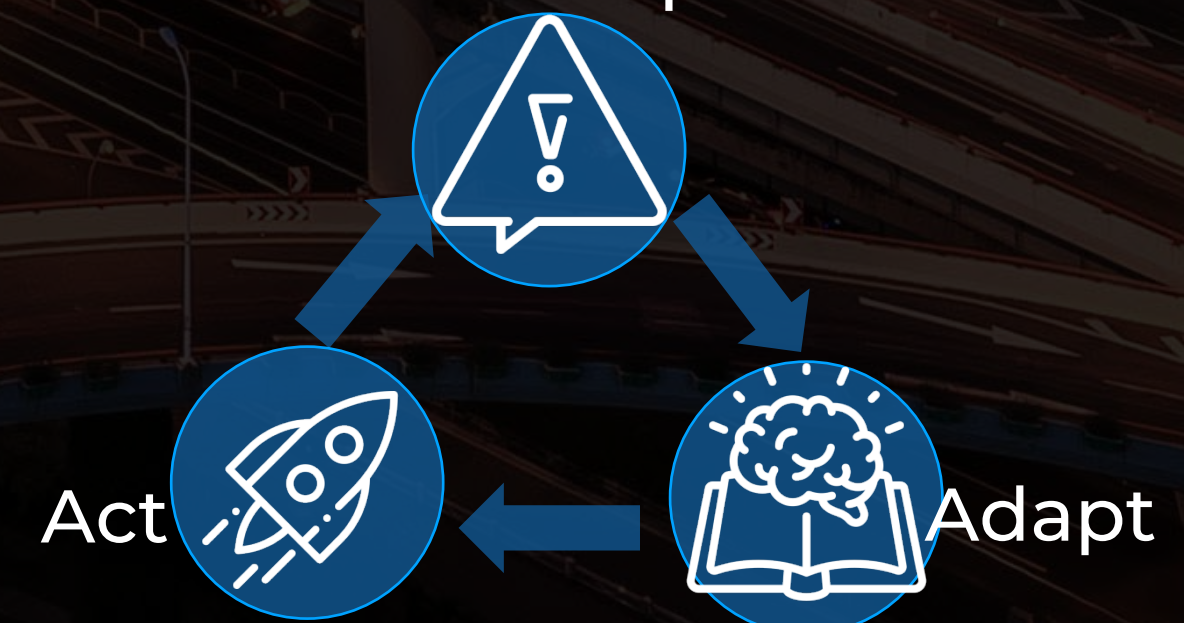
Great potential for development

DO

LEARN

- Find Gaps
- Adapt
- Act

Thank you for your attention!

Q/A