Evaluating preconditions for implementing Mobility as a Service (MaaS) in Romanian context

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Abstract

Rapid urbanisation, climate change, societal and demographic changes are some of the trends that challenge transportation networks and services. The increasing development of information and communication technologies (ICT) foster the development of concepts that optimise the transport network, use the vehicles more effectively and provide seamless trips. Mobility as a service (MaaS) is an emerging paradigm shift in transportation that has received increased attention in the past years, and stands for integrating various forms of transportation into a single mobility service accessible on demand. It aims to bridge the gap between public and private transport operators working at different territorial scales, and considers the integration of currently fragmented tools and services (Kamargianni; Matyas, 2017). Parts of the MaaS ecosystem already exist in many cities but, the significant legislation differences between EU member states can delay the implementation of MaaS. Thus, the current challenge is to create high- performance service packages to transform the mobility behaviour towards more sustainable transport system.

This paper aims to identify Romanian cities degree of preparation for MaaS implementation relying on MaaS readiness level indicators (for local authorities) such as strategic readiness, internal use, shared use and share understanding (CIVITAS Eccentric, 2017), that offer a starting tool to speed up the process among local authorities. Relying on the analysis of relevant strategic planning documents with an impact on transportation and mobility, the objectives of this research are identify key aspects that support MaaS and to extrapolate findings into a set of actions and

directions towards a MaaS implementation strategy. Along a comprehensive understanding of the MaaS from a strategic planning perspective, this paper offers perspectives for its inclusion in relevant national and local documents and sets the context for further discussions between academia and local authorities.

Keywords: *SDGs, smart-mobility, administrative capacity-building.*

1. Introduction(Maa&SDG)

Urban transport plays an essential role in meeting the objectives of economic competitiveness, social cohesion and sustainable growth. As such, an efficient transport system is the backbone of every successful city. However, the majority of today's transport systems were designed/ configured to serve societies with rather different characteristics and needs. Gradually, the way people live has been restructured by the economic and technological development. Therefore, our society needs efficiency and connectedness. These are also the core characteristics of modern transport systems.

Understanding the drives in urban transport networks, the pressures they place and the changes they need, are the first steps towards creating suitable transport systems to meet our society's needs. Kamargianni et.al (2015) identified hyper-urbanization, demographic and societal change, climate change and technological development, as the main trends that have been impacting cities, in a global context. Some of their outcomes including the rapid development of cities, alarming CO_2 levels in cities or population growth can be regarded as both a necessity and an opportunity for change in urban transport sector.

Providing sustainable modes of transportation along with seamless door-to-door mobility can be the solution for the above-mentioned challenges. One of the main challenges is, that even though the transport industry has separate organizations for the various modes, this might not reflect the way individuals think about their journeys or plan them. The complexity of using a variety of transport modes might be regarded as intimidating. Thus, the solution might be to integrate various transport modes in a way that creates seamless door-to-door mobility experiences for the users. One suitable solution to this aspect is implementing Mobility as a Service (MaaS), as Kamargianni et.al (2015) noted.

In addition to this, the implementation of the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals is an important stimulating and accelerating factor for the MaaS model implementation and its future policies.

The decrease of urban pollution and by implementing an efficient MaaS ecosystem is consistent with the 2°C target and could contribute substantially to financing the Sustainable Development Goals.

There are several pilot projects that show the effectiveness of MaaS ecosystem, including Helsinki and Whim mobility system, Qixxit in Germany, Moovel in Germany; also testing in Boston, Portland, and Helsinki, Beeline - Commuters in Singapore, SMILE app in Vienna, Bridj Commuters in Boston, Kansas City, and Washington, DC, Communauto/ Bixi - Cities in Quebec, Canada etc.

In Romania there are software application that can be use to help mobility (ex. Moove It App, Ally Mobile Payments), but there is no correlation between public agenda, SDGs implementation and paying methods. The existing apps can be used for identifying the shortest or the fastest routes for public transportation (including all types of public transportation), but there is no integration with paying systems for the services.

In November 2018, The Romanian National Strategy for Sustainable Development was approved in a first revised version after the Declaration of the Parliament of Romania on Sustainable Development Goals of the 2030 Agenda for Sustainable Development was adopted in April 2016. One year later, in April 2017, the Department for Sustainable Development was created by the Government Decision 313/2017. Its main responsibility is to ensure the implementation of the 2030 Agenda at national level, along with complying with conditions of the United Nations and their goal to *leave no one behind.*

Main objective of the implementation of the MaaS policies and programs consists of changing travel behavior and modal split in a voluntary way in favor of public transport (Goodal, Fishman et. al). In addition to this, implementing MaaS model at a large scale as implicitly favors the effective implementation of SDGs.

The MaaS systems implementation can contribute to SDG implementation: a user friendly system, reduces personal vehicles use, reducing the car numbers on the streets simultaneous and reducing traffic congestions, helping people arriving to the destination in a way that is faster, cleaner, and less expensive than current options.

In order for MaaS to work effectively conditions need to be met, such as widespread mobile internet networks with high levels of connectivity (3G/ 4G/ 5G), secure, dynamic and up to date information on travel options, schedules and updates and integrated payment schemes.

For the effective correlations between Sustainable Development Goals and indicators and implementation of new Smart City solutions, this seems the right moment to begin. SDGs concepts start to be promoted and therefore, complementary mobility policies and their indicators can be monitored and evaluated. Mobility mapping along with an important SDG analysis, can be made by relying smart solutions, such as MaaS.

Public cooperation is essential in this process, and the Stakeholder Allegiance method can be very effective for developing an SDG acceptance culture, that may require to change some of the existing habits.

The results of adopting MaaS implicitly impact on most of the 17 SDGs. An efficient and effective transportation system is essential for increased social inclusion, environmental issues and economic competiveness. MaaS can lead to increased spatial and social integration of vulnerable groups, as well as improve accessibility for all users (Shaheen and Cohen 2016).

Smart cities solutions, smart mobility solutions (namely MaaS) along with the use of new technologies for innovation in infrastructure and integration of services can contribute to reach SDG target 11.2 - Providing access to safe, affordable, accessible and sustainable transport systems for all, improving road safety,

expanding public transport, and granting equal accessibility for vulnerable users. Additionally, it contributes to reach target 9.1.- Developing quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all. The shift towards new mobility service concepts is also of great relevance for other SDGs, but particularly for Climate Action (SDGs 13) and Reduced Inequalities (SDG 10). The electrification of transport, the expansion of public transport and the integration of services can make a crucial difference on cities' air quality, contribute to mitigate climate change and ensure equitable access to all (European Commission, 2018).

The most relevant SDG for MaaS implementation is *SDG 11 - Make cities and human settlements inclusive, safe, resilient and sustainable.* Its purpose is to enhance the quality of life in cities and avoid and reduce environmental decline by using smart technologies to ensure sustainable development for the communities and creating Smart Cities (Ministry of Environment, 2018).

In this context, 2017 brought renewal plans for the public transport vehicle fleet. The local authorities announced the launch of the tender for the acquisition of 400 buses, 100 trams and 100 trolleybuses, as well as an acquisition procedure for the installation of free wireless internet for travelers in public transport, as long with real-time information systems. Another smart solution for Bucharest is expected be build the municipality's own infrastructure to using LoRa Wan technology, that will enable direct applications for parking systems, public, public lighting or alternative infrastructure.

Projects for smart car parks will begin to set up 13 parking lots, which add up to 3,000 parking lots Smart-parking systems are expected to be implemented by the end of the year, in some of these new parking lots. Users will be provided with information regarding the occupancy degree of the parking lots, potential reservation and payment.

Moreover, a private initiative application called Civic Alert with country-wide coverage, was launched in 2015.Using this app, citizens can alert the authorities regarding aspects that need an immediate solution (illegal parking, major traffic congestions, hazards, attacks, etc.). In case a written answer is required, it will be send directly to the ones making the referral.

In the area of territorial development, it is envisaged the participation of Romania, through MDRAP, at the elaboration process of the EU Urban Agenda (composed of 12 Action Plans drafted within 12 Partnerships established on different themes); on this basis, the public policy on urban development at national level will be defined. The estimated deadline for elaborating this public policy project is Q4/2019. In February 2018, a first version of the Action Plan corresponding to the Partnership on Jobs and Skills in the Local Economy, having as coordinators MDRAP, the city of Rotterdam (Netherlands) and Jelgava (Latvia) was drafted. The draft Action Plan will be available for public consultation in the summer of 2018 (Ministry of Environment 2018).

The Resolution adopted by the General Assembly on Work of the Statistical Commission belonging to the 2030 Agenda for Sustainable Development

(A/RES/71/313, E/CN.3/2018/2, Annex II – March 2018), contains annual refinements, identity the SDGs official indicators for the implementation. For the MaaS ecosystem, the most important are:

Target: 11.2 - By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.

Indicator 11.2.1 - Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities Target: 11.A Support positive economic, social and environmental links between urban, per-urban and rural areas by strengthening national and regional development planning.

Indicator 11.A.1 Proportion of population living in cities that implement urban and regional development plans integrating population projections and resource needs, by size of city (United Nations, 2018).

2. Mobility as a Service concept

2.1. Definition of Maas

Due to the novelty of the concept, there is still a wide gap in literature and knowledge about what it means and the ideal design of sustainable urban mobility plans (SUMPs). The MaaS model integrated concepts that have been extensively discussed in the transportation sector research throughout the last decades, such as integration, interconnectivity, optimization of transport services, smart and seamless mobility and sustainability. According to Kamargianni and Matyas (2017) this model also includes concepts including *as a service and personalization,* that emerged along with the Internet of Things (IOT) and the sharing economy. Although there are already mobility services that cover these aspects (car-sharing, on-demand transport), they usually operate individually, without being integrated with other transport modes, more specifically with public transport. As such, MaaS enables a co-operative and interconnected single transport market, providing users with free mobility. In order for this to be achieved is needed that a new player enters the transport market, the MaaS provider. The MaaS provider should be able to remove many of the vulnerabilities related to travelling and offer users and advanced travel experience. Relying on this, Kamargianni and Matyas (2017) defines MaaS as follows:

Mobility as a Service is a user-centric, intelligent mobility distribution model in which all mobility service providers' offerings are aggregated by a sole mobility provider, the MaaS provider, and supplied to users through a single digital platform.

However, the first definition of MaaS is offered by Hietanen (2014) and it is described as a mobility distribution model that delivers users' transport needs through a single interface of a service provider. It combines different transport modes for a tailored mobility pack-age. This interpretation encompasses some of the core characteristics of MaaS, such as customers' need-based service bundling, cooperativity and interconnectivity of transport modes and service providers.

2.2. Mobility as a Service: stages of integration

In the Feasibility Study for Mobility as a Service concept in London, Kamargianni et. al (2015) identified six main stages of cooperation that were further used to describe MaaS services, as follows:

1. Cooperation in terms of providing discounts for combined subscriptions;
2. Ticketing integration: one (smart) card allows access to all transport modes included in the service;
3. Payment integration: a single invoice is used for all mobility needs;
4. ICT integration: information about transportation modes can be accessed using a single online application or digital platform;
5. Institutional integration: multiple modes included in the service are own and operated by one company;
6. Integration with tailored mobility packages: customers can prepay for specific amounts of each service according to their travel needs.

Relying on them, five MaaS levels of integration were defined: basic integration (level 1), advanced integration without mobility packages (levels 2-5), advanced integration with mobility packages (level 6).

The information presented in this section enabled us to assess the current status of MaaS integration in Romania and to expand upon the MaaS readiness indicators levels in the following sections.

2.3. Core characteristics of MaaS

Jittrapirom, Caiati et. al (2017) identified twelve selected MaaS schemes from Europe and the United States, that were conceptualized, designed and implemented. Their research into the matter is wider, however, case studies and pilot projects that lack the majority of these attributes omitted by means of limited relevance.

Core characteristic	Description
1. Integration of transport modes	One of the goals of MaaS schemes is to encourage the use of public transport service, by bringing together multi- modal transportation and allowing users to choose them in their intermodal trips. Transport modes to be potentially included: public transport, taxi, car sharing, bike-sharing, car-rental, on-demand bus-services. Conceptualizing a service beyond urban boundaries, might also embrace long- distance buses, trains, flights and ferries.
2. Tariff option	MaaS platform provides users with two types of payment schemes to receive access its mobility services: *mobility package* and *pay-as-you-go*. The package offers bundles of various transport modes and includes a certain amount of km/minutes/points that can be used I exchange for a monthly payment. Pay-as-you-go-option charges users according to effective use of service.

3. One platform	MaaS relies on a digital platform (mobile app or web page) by means of which the users gain access to all necessary services for their trips, such as trip planning, booking, ticketing, payment and real-time information. In addition to this, they might also have access to complementary services including weather forecasting, synchronization with personal activity calendar, travel history report, invoicing and feedback.
4. Multiple actors	MaaS ecosystem is built on interactions between different groups of actors through a digital platform: demanders of mobility (e.g. private customer or business customer), a supplier of transportation services (e.g.) public or private and platform owners (e.g. third party, PT provider authority). Other actors (e.g. local authorities, payment clearing, telecommunication and data management companies) are allowed cooperate to enable the functioning of the service and improve its efficiency.
5. Use of technologies	Different technologies and devices are combined to enable MaaS, including computers and smartphones, a reliable mobile internet network (wifi, 3G, 4G, LTE), GPS, e- ticketing and e-payment system, a database management system and integrated infrastructure of technologies (IoT).
6. Demand orientation	MaaS is a user centric paradigm which seeks to offer the most efficient transport solution (from a customers' perspective) relying on a multimodal trip planning feature along with the inclusion of demand-responsive services, such as taxis.
7. Registration requirement	The end-user is required to join the platform to gain exclusive access to all available services. Accounts are available for individuals, however, in certain circumstances accounts for the entire household are available. The subscription facilitates the use of the services but also it enables the customization of the service.
8. Personalization	This feature ensures that end-user requirements and expectations are met effectively by considering the uniqueness of each customer transport needs. The system provides specific recommendations and tailor-made solutions based on their profile, their expressed preferences and past travel behavior (travel history).
9. Customization	The feature enables users to change the given service option according to their preferences and needs. This can increase the attractiveness of MaaS among travelers and customers, their satisfaction and potentially, their loyalty to the new service.A freely chain trip or a specific mobility package (with a different degree of usage of certain transport modes) can be made to better achieve the desired travel experiences.

Figure. 1. Description of MaaS core characteristics
Source: *adapted from Jittrapirom, Caiati et. Al (2017)*

3. Evaluating the current stage of MaaS in Romania

3.1. Romanian strategic planning documents with a direct impact on the implementation MaaS

As noted, the core elements of MaaS ecosystem are infrastructure (widespread use of smartphones and mobile networks 3G/ 4G/5G with high levels of connectivity), data providers (intermediary layer between transportation operator and user that exchanges data from multiple service providers, providing the application programming interface (API), gateways and analytics on usage, demand, planning and reporting), transport operators and a trusted mobility advisor (Goodall, Fishman et. al, 2017).

This section revises national strategic documents with a focus on urban transport, along with local initiatives in two Romanian cities (Bucharest and Cluj-Napoca) to identify specific measures and lines of actions towards improving aspects that enable the development of the core elements of MaaS, and that could bring us closer to this new mobility paradigm.

Big and Open Data and ICT can provide tools to connect users, moving stock and infrastructure and to integrate optimized of transport systems across these domains. It is essential to highlight that the real potential lies in deploying data availability and smart data analysis to develop smart strategies for optimization in the physical realm than simply collecting virtual data (European Commission 2017).

For that reason, The Digital Agenda for Romania (2014-2020) defines four fields of action in order to ensure sustainable economic development and to increase its economic competitiveness. The first field of action targets cost reduction in the public sector and favors the transition towards modern administration by means of e- governance, interoperability, cybernetic security, cloud computing, open data, big data and social media. Four lines for strategic development were identified, with specific lines of actions, as follows:

Strategic development lines	Action lines	Description
OD1 Public availability of free, accessible, reusable and sharable data	Creating the legal framework for free access to Open Data and Free sharing of information **(strategic action)**	The Open Data concept describes the information collected or generated by public authorities. These data are available for the wider public in a format that can be easily reused and shared.
	Creating a legal framework for the reuse of public information. **(strategic action)**	The benefits of Open Data rely both in collecting using the available data. Collecting data alone and presenting it, fails to solve pressing problems of the civil society.

	Identifying relevant standards and formats to be used in sharing data. **(strategic action)** Increasing the participation of civil society in data collection along with its capacity to use and integrate the free Open Data.	
	Providing trainings for the member of the authorities regarding Open Data Concept. Identifying funding opportunities and creating lasting partnerships with potential supporters (civil society, private operators interested in sharing their data, investors)	
OD2 Standardizing operations	Correlating the public need of information with publishing the relevant set of data.	Public authorities are required to create a standard format for Open Data, according to the needs and preferences of the public.
OD3 The Open Data available from public institutions need to be available on a single, national platform.	Expanding of data sets from www.data.gov.ro. (strategic action) Expanding the features of the national platform data for European exchange. (operational action)	Existing data has been centralized in a permanent surveillance system in order to secure Open Data. The next step stands for stimulating authorities to upload as many data sets as they have, and to update them frequently.
OD4 Using the advantages offered by free digital applications/software and free Open Data standards.	Identifying relevant criteria for the choice of digital applications to be used by public administration. Supporting economic operators to offer their support for free digital applications.	

Figure 2. Open Data – strategic development priorities for Romania
Source: *adaptation from The Digital Agenda for Romania (2014-2020)*

Strategic development lines	Action lines	Description
BD1 Evaluating the administrative framework and supporting the implementation of Big Data Systems	Defining data sets to be collected. (strategic action) Collecting data from multiple sources: • physical documents	Challenges: • the data sets to be analyzed have a particular dynamics and they often change in real time;
	• digital documents • access points from governmental network Internet sites Social media Operation systems available (operational action)	• the format of this available data varies from semi-structured data to unstructured one.
	Defining the analysis process for the collected data (strategic action)	
BD2 Using Big Data concepts for optimizing public services and reducing costs	Implementing systems that use Big Data	The Government is becoming more and more dependent on a variety of services that generate extensive amount of unstructured data.

Figure 3. Big Data – strategic development priorities for Romania
Source: *adaptation from The Digital Agenda for Romania (2014-2020)*

The flow of big and open data, while of central importance for smart mobility service and systems, will, however, require significant governance and regulatory system to ensure the interests of all stakeholders and that their access to available data are equally protected. The line between public and private data resources is unclear at the moment, potentially to the benefit of all transport users. Furthermore, public and private transport providers should be encouraged to share and make public as much of their data as they can, to provide seamless user interface across modes. Ensuring the privacy and anonymity of their users should be visibly paramount to ensure user acceptance (European Commission 2017).

Equally important, The Smart Cities Guide (MCSI, 2018) argues in favor of promoting innovative technologies to increase the quality of life in cities along with the use of smart technologies for the sustainable development of communities. More specifically, it aims to raise understanding on the smart city concept and smart technologies and to implement large scale projects relying on smart technologies. Urban transport is among the main fields in which smart technologies are to be integrated. The solutions provided target smart parking, intelligent traffic management and integrated multi-modal transport.

In addition to this, the smart use of energy that leads to the decrease of transportation costs, monitoring the number of travels and dimensioning the public transport capacity accordingly, smart traffic monitoring in order to decrease/ eliminate congestions and facilitating the customer's access to different transportation modes are among the expected outcomes stated in the guide.

Given aims of this guide regarding the integration of new technologies for improving the efficiency and sustainability of the transport system, we are confident that that the Smart Cities Strategy (to be released for public consultation) will provide specific directions for cross-sectorial policies that facilitate the development of MaaS in Romania.

The contribution of mobility service innovations to sustainable demand and land use management is therefore dependent on embedding Open Data and Big Data concepts in an overall mobility and transport strategy for the whole city. Digitalization, on-demand mobility, flexible and cleaner production can increase the chances of higher density development and a more balanced mix of land-uses (residential, commercial, school, parks), potentially reducing the demand for unsustainable travel modes. Validating the positive contribution that new mobility services and systems can make to sustainable, transit-oriented urban development should be of central concern of our national and local innovation efforts.

Reducing the share of travel by combustion engine vehicles can lead to significant reduction in CO2 emissions. This involves a reduction of use of personal-use and single occupancy vehicles by promoting the use of energy-efficient modes such as conventional public transport, other shared transport modes, as well as cycling and walking.

New technologies, big data and real-time information on demand and supply can contribute to a more sustainable modal shift.

3.2. Case study: MaaS readiness indicators for two Romanian cities: Bucharest and Cluj

As highlighted in the previous sections, MaaS has been seen as one of the decisive success factors with regard to changing the transport behavior of citizens and to identify modes for cities to achieve their sustainable mobility goals.

MaaS readiness level indicators (for local authorities) was developed as part of the CIVITAS ECCENTRIC project (funded by the Horizon 2020) and highlight the aspects of MaaS development identified so far, to inform local authorities about the current situation for establishing MaaS in the local context. Furthermore, these indicators provide a cross-sectorial view on the degree of readiness of local authorities for this transition, with a focus on the decisions regarding transportation that have already been made and on ways to implement new transport services.

The aim of the MaaS readiness level indicators is mainly to raise the awareness of local authorities on the critical aspects that can potentially be left out when planning for a more sustainable and inclusive transport system. In addition to these, they can be used to expand upon MaaS in the local context. Although the MaaS model as presented in the previous sections is particularly complex in terms of aspects to be considered, the MaaS readiness indicators level include only aspects that local authorities could influence directly, and therefore, the offered perspective may be rather limited.

MaaS readiness level indicators are built upon four main themes (strategic readiness, internal use, shared use and shared understanding) and eight different components (strategic focus, parking policies, internal travelling, use of shared mobility, shared economy, public transport, integration platform, visibility).

Strategic readiness depicts measures that local authorities from both cities use to promote, support and incentivize MaaS. For evaluating its first component, the strategic focus, according to the scale developed in the project, 1 point is allocated when no explicit measure was taken to support MaaS development in the city while 5 points are allocated for cities with an advanced degree of MaaS integration, more specifically when the local authority is working systematically on this matter. Additionally, in the case of parking policies 1 point is given when authorities have no parking policy and 5 points are allocated when the existing parking policy supports shared cars by offering incentives (cheaper parking or parking zones for shared vehicles and easy to acquire parking permits).

As shown in the diagram none of the local authorities in the two cities have taken active measures to support MaaS, and there is no parking policy for shared vehicles, at the moment.

The Internal Use component refers to travelling guidelines for the staff and politicians; 1 point is allocated when internal travelling for staff and politicians of the local authority do not prioritize sustainable mobility, while 5 points are gained by the cities with specific travelling instructions that prioritize sustainable mobility, their travel patterns are monitored annually and there is a notable decline in the use of private cars in the last three years. Since there is no clear information about these initiatives in any of the investigated cities a point was offered for each of them.

Shared understanding and visibility describe the ease to identify shared or multimodal mobility offers. Thus, 1 point is given in cases when customers can find multimodal information about at least two modes of transportation; 5 point receive the cities in which customers can find MaaS services and the usage has increased within last year. In this section, both cities received one point. However, the existing mobility applications (i.e. Moovit) can provide tailored options for customers' travel preferences considering aspects such as route type (least walking, least transfers), transport modes (bus, train, tram, metro, trolleybus, bike) and desired departure / arrival time. Another component of shared understanding as the project depicts it stands for integration platform. Both cities received one point since the local authority has not opened data gathered from public transportation operations. The most advanced level of platform integration relies on the cooperation of third parties to sell MaaS services by using the same apps as other MaaS operators.

Shared use proposed components are public transport and shared economy. In the case of public transport the focus lies on the diversity of channels one can use to buy public transport tickets (exclusively from service providers or they can be integrated with other services as well). In this case, both cities received one point, since public transport tickets can be purchased only from the service operator. In the case of Bucharest the two main transport operators (RATB and METROREX) generally, sell their own tickets. In December 2017, however, an integrated card to

be used for transportation modes administered by both operators was introduced. This options is particularly suitable for users who change modes of transportation frequently in the city. This integrated payment option is not available for metropolitan lines or for the express ones.

In this particular context, shared economy refers to availability of shared and combined travel options. In both cases there are no companies offering shared vehicles in the local authority.

The diagrams below depict the result of the evaluation of MaaS readiness indicators level for Cluj-Napoca and Bucharest. Even if the cities received the same score, it is visible that highest score is received for integration platforms.

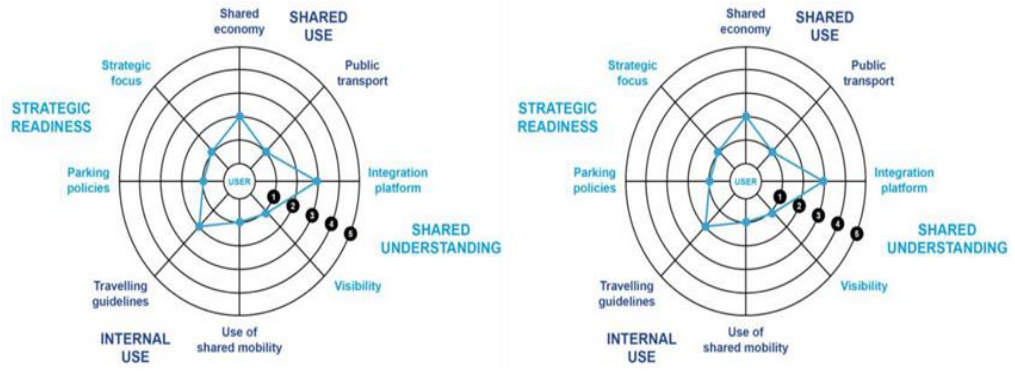

Figure 5. The MaaS readiness level indicators for local authorities: a. Bucharest; b. Cluj Napoca.
Source: *adaptation from (Aaltonen, 2017)*

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