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Getting ready for the future: How can we reach user-centric mobility in Europe by 2030?

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Abstract

The Mobility4EU project created a vision for a user-centric and cross-modal European transport system in 2030 and an action plan to implement that vision. We used a combination of creative and analytical methods to come from problem identification to the action plan applying a user-centric methodology that included stakeholders in each step of the process. The Action Plan details measures that address technical topics but especially refer to societal aspects and issues for multi-stakeholder interaction, as e.g. policy, user acceptance, standardization, collaboration and the integration of the user perspective into the R&D&I process. The Action Plan adds to the other similar initiatives by providing recommendations on mainstreaming of universal design and user-centric design processes, synergies and collaboration potential between modes and the combination of transport of passengers and freight building on the quadruple helix model of collaboration between academia, users, industry and policy makers.

Keywords: scenarios, vision, roadmap, multimodal transport, co-creation, mobility as a service, universal design

1. Introduction

Global socio-economic and environmental megatrends are posing new challenges and demands on mobility in Europe. Novel technologies and services for passenger and freight transport provide opportunities to answer these. However, in order to become disruptive and change behaviour, these solutions have to be cross-modal and tailored to the needs of users.

The Mobility4EU project integrated all relevant stakeholders including user representatives employing a user-centric perspective and a participatory framework involving all relevant actors from inside and outside the transport sector covering all transport modes including international, European and national stakeholders (including specific groups and communities that are vulnerable to be excluded, technology suppliers, policy makers, transport service providers, research organisations). The Mobility4EU project created a vision for a user-centric and cross-modal European transport system in 2030 and an action plan to implement that vision.

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The Action Plan for Transport in Europe in 2030 details measures that address technical topics but especially refer to societal aspects and issues for multi-stakeholder interaction, as e.g. policy, user acceptance, standardization, collaboration and the integration of the user perspective into the R&D&I process. Multiple strategies and roadmaps already exist that address these issues in its entirety or for individual modes or freight only. Nevertheless, these are initiatives that are driven by the research community, the industry or policy, but only rarely from a user perspective. The Action Plan produced by the Mobility4EU project intends to fill this gap and provide recommendations for R&D, deployment, policy and regulatory framework and other implementation related issues from a strictly user-centred and cross-modal perspective. Thus, the Action Plan adds to the other initiatives by providing recommendations on mainstreaming of universal design and user-centric design processes, synergies and collaboration potential between modes and the combination of transport of passengers and freight. The aim of this paper is to introduce the process of creating this action plan and demonstrate a user-centric methodology that included stakeholders in each step of the process, namely the identification of key trends and solutions, scenario building, the evaluation of scenarios, vision building and the creation of the action plan. In addition, the paper proposes a research and innovation agenda for user-centric mobility which are being elaborated in the European Transport and Mobility Forum, one of the main outcomes of the project.

2. Overview of participative methods

The work towards the Action Plan started with the identification and formulation of 29 trends that are projected to have relevance in shaping the future European transport system in 2030 (L'Hostis, Chalkia, de la Cruz, Muller, & Keseru, 2019). Then, together with European experts from all fields in transport of passengers and freight, a portfolio of 93 promising and innovative transport solutions across all modes answering the identified trends and user needs has been composed. Four scenarios for the development of future transport in Europe (Data world, Digital nomads, Slow is beautiful, Minimum carbon) have been co-created with stakeholders using the intuitive logic method (Keseru, Coosemans, & Macharis, 2019). The scenarios, and thus also the underlying solutions, have been ranked within a structured stakeholder evaluation, the Multi-Actor Multi-Criteria Analysis (MAMCA) (Macharis, de Witte, & Ampe, 2009). A further prioritization of solutions was done through an adapted extended Failure Modes and Effects Analysis (FMEA) (Chalkia, Sdoukopoulos, & Bekiaris, 2018). The vision building was then based on a creative process with stakeholders which led to the Vision for Transport in Europe in 2030 which concentrates on interactions, combinations and interfaces between prioritized solutions. Finally, the Action Plan to implement that vision has been drafted based on the results achieved previously with a focus on the prioritized solutions within the MAMCA and the mitigation strategies developed in the extended FMEA. The Action Plan underwent a broad stakeholder consultation before finalisation (Figure 1).

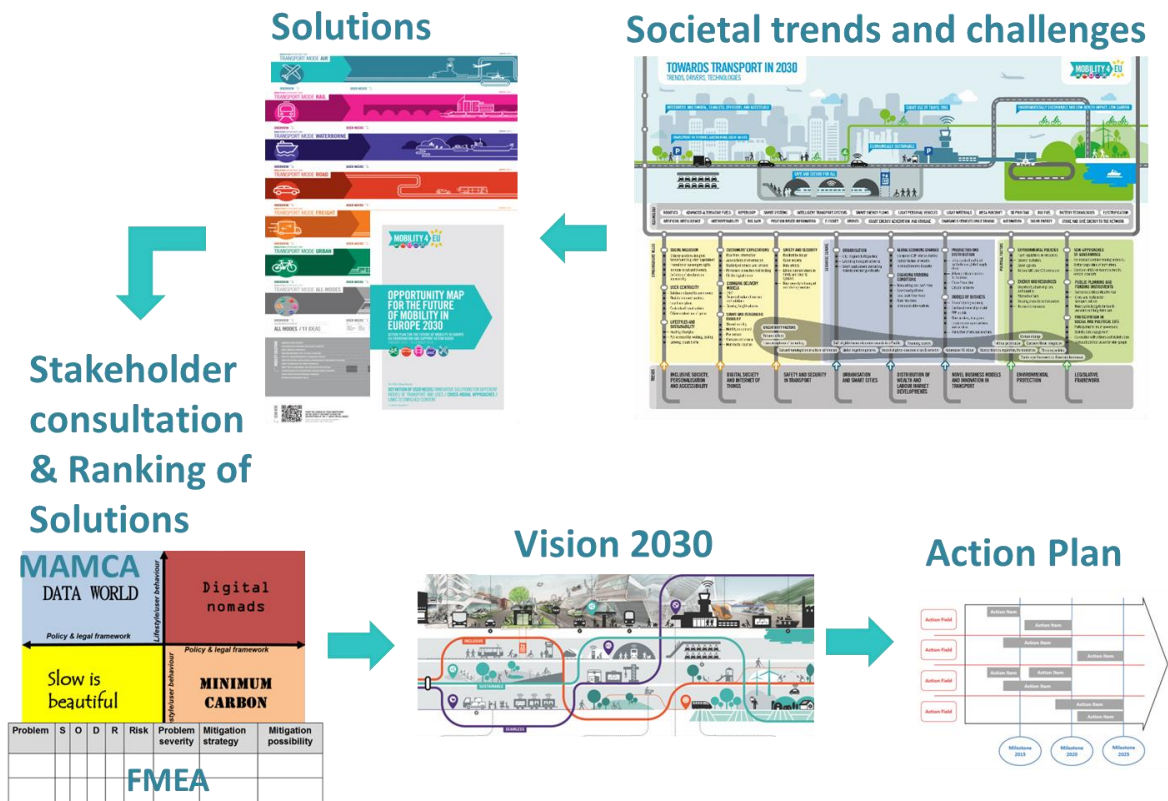


Figure 1 Mobility4EU process towards Vision and Action Plan for transport in 2030.

3. Summary of MAMCA results and vision

The MAMCA evaluation ranked the four scenarios for each stakeholder group based on criteria and weights from stakeholders. The results show that the scenarios Digital nomads and Minimum carbon are the highest rated for most of the groups. It points out the importance of government intervention and support in developing the transport system as both scenarios propose a pronounced role of governments in supporting digital innovation and interoperability (Digital Nomads) or introduce strict regulations to limit CO₂ emissions (Minimum Carbon).

These two scenarios were used as a basis for the development of a common vision. Both scenarios favour a high level of standardisation and interoperability, a regulatory framework that supports personal and corporate carbon emission reduction as well as the full digitalization of the transport system, albeit to partly different ends. Personalization is in contrast to a strict focus on shared use and active mobility. The increasing of capacity to answer rising demand conflicts with the reduction of demand to fit existing capacity.

The vision was co-created during a workshop with the stakeholders using creative graphical brainstorming. It describes a future of transport of passengers and freight that is decarbonized, sustainable in economic, environmental and social terms and offers tailored mobility solutions for all. It thus can be detailed as:

INCLUSIVE AND USER-CENTRIC

Universal Design is mainstreamed into all aspects of the innovation process. When needed assistance is provided for passengers by humans or technology guaranteeing more freedom for people with disability and reduced mobility. Transport equity is ensured through options affordable for all. Digitalization and automation enable personalization. Co-creation and participative planning and governance with citizens are common.

SEAMLESS

In passenger and freight transport, efficiency and convenient and seamless door-to-door-options are ensured. Full digitalization and automation as well as joint approaches of passenger and freight mobility allow for optimized capacity use. Safety in transport is enhanced. High integration between modes and thus multimodality and

sychromodality are enabled by connected infrastructures, vehicles and services and interoperable interfaces. Standardization facilitates this interoperability. Standardization and modularization are the basis for the physical internet concept and open freight networks. Simplified testing, certification and authorization supports innovation of diverse vehicle types and integrated mobility, booking and ticketing services. Data and cybersecurity are ensured as well as supply chain visibility. Safety in transport is enhanced. Incentives, urban design and updated infrastructure motivate the shift to low-carbon shipping options, public transport, shared modes and walking and cycling. All this, as well as efficient management of traffic flows, also leads to less cars and more attractive public spaces.

SUSTAINABLE

Zero/low-emission vehicles including adequate electricity/alternative fuels infrastructures are deployed in all modes. Vehicles and infrastructure, electricity and alternative fuels are produced sustainably. Low-carbon and low-emission transport options and an improved modal split are incentivised for passengers and freight and vehicle ownership is discouraged, e.g. through carbon footprint accounting, measuring and verification as well as decarbonisation regulations for logistics. Circular economy further supports sustainability. Its implementation is supported by harmonized policies, regulations and incentives, but also by innovation for new materials and the advancement of recycling, reuse and efficiency in usage of resources. Decarbonized and more sustainable freight transport is further enabled through horizontal collaboration and new business and governance models. Last not least, reduction of noise and noxious emissions minimize the impact on people and environment.

4. Action Plan

In order to fulfil this vision concerted action is needed from users, research, industry and policy makers. The Mobility4EU Action Plan is structured within six main action areas:

- (1) Low-/zero emission mobility (electrification and hybridization and other alternative fuels)
- (2) Automation and Connected Driving
- (3) Safety and (Cyber) Security in Transport
- (4) Mobility Planning
- (5) Cross-modal/ cross-border transport and Integration of Novel Mobility Services in Public Transport
- (6) Inclusion: Putting the User in the Centre

For each of these, an individual roadmap has been compiled that details recommendations for research, innovation, and implementation in transport both in technical and non-technical domains for achieving the future transport system envisioned. Proposed actions were categorized into action fields depending on whether they had a technical or societal/user-centric focus or if they principally targeted an improved collaboration of stakeholders from different domains. Actions in the roadmap have been further compiled along the following timeline: immediate action (2020), short term (2025) and mid-term (2030). Also, the responsible stakeholder groups for the implementation are listed.

5. Priority areas for stakeholder collaboration

The following three priority areas for further research, innovation and collaboration have been identified in order to address the gaps in user-centric transport.

5.1. Improving participation in urban mobility planning

Better participation of citizens and stakeholders in general are key to improve the quality and acceptance of new transport solutions including infrastructure, vehicles, services and new business models. According to Schroeter, Scheel, Renn, & Schweizer (2016, 116), public participation “enhances acceptability and legitimacy, contributes to improved efficiency of decisions, promotes innovative solutions, and improves the quality of decisions.” Arguments in favour of public participation often stress that citizens possess values and knowledge relevant to decision-making, public participation can increase support for outcomes and facilitate implementation, and it is democratic since policy decisions affect the public (Larson & Lach, 2008).

A user-centric transport system can only be created if participation is facilitated at every stage of mobility planning from problem identification to implementation and monitoring. Co-creation, for example, involves citizens in data collection to explore problems in their neighbourhoods, helps to co-design alternatives to solve these problems,

implements the solutions with the citizens and monitors their impact. There is, however, still little research carried out that looks at the actual benefits of co-creation in terms of finding sustainable and supported solutions and how a combination of online participatory tools and traditional offline tools can help to increase citizen participation. Another question is how reliable data can be collected through the engagement of people in data collection (citizen observatories and smart surveys). In addition, it is still important to investigate how face-to-face communication can improve consensus making drawing on the knowledge and experience of their members to propose solutions adapted to their needs and interests.

5.2. Universal Design and user-centric approaches

One of the six main action areas of the Mobility4EU Action Plan is 'Inclusion: Putting the User in the Centre'. Inclusion within this action area refers to providing accessible and usable transport for all users. The main focus within this action field is on the mainstreaming of universal design principles[†] to vehicles and infrastructure, so that they will be generally accessible and usable for all (Audirac, 2008). Application of universal design guarantees full accessibility to vehicles in all modes and transport infrastructure as well as mobility services, in particular it facilitates the use of the transport system for persons with disability and reduced mobility (people with different kinds of disability (including wheelchair users) or older people, but also people with heavy luggage or people with little financial resources). Furthermore, transport equity and spatial accessibility of transport in order to enable access to essential services, employment, shopping opportunities and healthcare to everyone by taking into account e.g. the geographical spread of public transport stations and other mobility services as well as affordability of transport offers are considered.

As immediate action within this action area priority was given to declaration of universal design in transport R&D&I as a precondition of financial support as well as to the support of activities to co-design and co-develop mobility services together with future users. In order to support researchers and developers in meeting their obligation in applying these aspects in transport infrastructure, vehicle and transport service, issuance of a guidance is required on EU level. Education on universal design as a concept to ensure accessibility to transport for all needs to be provided across Europe.

5.3. Viable business for seamless transport

In an ideal scenario, the future transport system will allow every citizen to travel seamlessly and easily from any place in Europe to another in a reasonable timespan, and by making use of multiple transport modes, including active modes of transport. Citizens will book a single ticket valid for all segments, though operated by different subjects. One potential concept to achieve such a transport system is the implementation of a Mobility as a Service or MaaS transportation system (Kamargianni, Li, Matyas, & Schäfer, 2016).

The Mobility4EU action plan addresses this concept in a dedicated main action area on cross-modal and cross-border transport. One major objective in this context is to foster collaboration among all transport stakeholders towards the development of a seamless transport system, based on best practices. This collaboration is crucial to create a critical mass of customers and guarantee profitability from the introduction of a MaaS system. If the introduction of a MaaS system lacks users needed, it is much harder to establish a platform and to find an according operator who will identify a business case in this. The other way around, potential users of such a MaaS system need to see a benefit in it to join the platform and to become a customer. Thus, an integrated platform and operator MaaS entity should be supported by governmental incentives and subsidies. For this, it is important to introduce a couple of smaller pilot cases with fully integrated and seamless functionalities and services not only to proof sustainability and profitability of such a concept but also to enable users to experience such a novel system in order to achieve acceptance.

[†] Universal design refers to designing and developing any transport and mobility provision so that it can be accessed, understood and used to the greatest extent possible by all people without the need for adaptation or specialized design for a specific group depending on their age, size, ability or disability etc. Universal design shall not exclude assistive devices where they are needed for particular groups of persons with disabilities.

6. Conclusions

The methodology and the results presented in this paper aim to help to create a user-centric transport system in Europe. These efforts have to be supported by all actors that shape our future mobility and logistics. In order to implement the Acton plan the European Transport and Mobility Forum[‡] has been established that focuses on collaboration between users, researchers, industry and policy makers. The questions raised above will continue to be discussed in this forum which aims to foster new research and innovation collaboration between users, academia and industry and policy making building on the quadruple helix concept (Carayannis & Campbell, 2010).

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[‡] www.etmforum.eu