D.3.1.4 Desk work on trends and scenarios with survey to experts

Activity 3.1-Understanding trends & scenarios on mobility services
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Introduction

Work Package 3 "Understanding mobility needs and trends" aims to build knowledge and define mobility needs in each partner location. The activities in WP3 will lay the foundations to understand the pillars of the project (ICT/Maas, Behavioural Change and Intermodal Mobility), and eventually to overcome barrier related to bottlenecks in multimodal connections and governance and lack of efficient multimodal networks (road, rail, air, water transport), as well as low connectivity and mobility of peripheral areas.

A.3.1. is designed to highlight which are the main activities and trends in Europe and worldwide, in relation to the three pillars of the project.

D.3.1.4 "Desk work on trends and scenarios with survey to experts" aims to support, integrate and complete the desk works of the ICARUS project on the three project's thematic pillars:

• D.3.3.1: Desk work on ICT for public transport and intermodal solutions:

• D.3.1.2: Desk work on behavioral change

• D.3.1.3: Desk work on policy framework

The experts involved in this addendum analysis are:

• Prof. Patrick Rerat (University of Losanne): Trends & Scenarios of spatial organization in relation to the mobility patterns and behaviours

• Prof. Giovanni Longo (University of Trieste): Trends & Scenarios of Public Transport and ICT

The following pages contain the results of the experts' audit.

Trends & Scenarios of spatial organization in relation to the mobility patterns and behaviours
Prof. Patrick Rérat
University of Losanne

Challenge 1: Urban changes

Assessment

Urban sprawl is a central feature of urbanization. It is characterised by (1) the important growth of municipalities around cities and (2) a low-density development.

Households with children are the main population group leaving the city/participating to urban sprawl. Social status seems to have more an impact in terms of location (e.g. some selected areas in cities or in suburbs).

Urban sprawl has been criticized among others due to its costs and to its ecological impacts (land consumption, landscape, automobile dependence).

Some counter-trends are observed in several European countries: cities are gaining again inhabitants after a period of demographic decline (reurbanization).

Reurbanization is explained by the renewed attractiveness of central areas for some parts of the population and by public policies (e.g. densification, quality of life).

Challenge 1: Urban changes

Links with mobility issues

There is a double causal relation between urban sprawl and automobility. On the one hand, the car has made urban sprawl possible by widening the range of the possible residential locations for households. On the other hand, low-density suburbs make the car central and the alternative modes less competitive (automobile dependence).

Debates in planning have focused on the way to design urban developments so as to make transit/cycling/walking more effective and desirable that motorized vehicles.

Key planning principles to reduce automobile dependence are density, mixed-use, proximity, the coordination between urban development and transport infrastructures, etc.

Densification refers to the increase of dwellings in urbanized areas (e.g. former industrial sites) with a focus on quality of life.

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Challenge 2: Ecological transition

Assessment

Most transports are based on the consumption of fossil fuel (carbonized and non renewable source of energy).

Transport is a (the?) major sector for the emissions of greenhouse gazes responsible for climate changes.

Transport generates additional environmental impacts such as air pollution, noise, congestion and space consumption that decrease the quality of life first of all in central and dense areas.

Links with mobility issues

Transport is a key sector in order to reduce and mitigate climate change.

Transition towards a low carbon mobility has to be implemented.

Challenge 3: Socio-demographic changes

Assessment

- A diversification of lifestyles is observed which means a diversification in terms of activities / life aspirations / daily rhythms / consumption / residential choice. Mobility is the way to combine the different activities and spaces of the everyday life.

- European population is ageing. The proportion of elderly people is increasing due to a higher life expectancy and to a decrease in fertility rates.

Links with mobility issues

- The needs for mobility are increasingly complex in terms of space and time.

- Leisure is a growing generator of mobility.

- Elderly people face additional challenges due to automobile dependence.

Challenge 4: Socio-demographic changes

Assessment

- Digitalization is at the core of technological changes.

- Digitalization impacts transport on various levels (supply, management, demand, etc.).

Links with mobility issues

- Digitalization may make transport more effective (e.g. management of traffic flows, train and buses circulation).

- Digitalization provides tools for mobility management (e.g. pricing, teleworking).

- Apps help users to access and combine mobility offers (e.g. timetables, car-sharing).

- Public transport may become more attractive as as the travel time is occupied/valorised through the use of ICT.

Challenge 5: Governance

Assessment

- Transport supply involves a wide array of actors (private, public, state-owned, NGO's).

- It is characterised by multilevel governance (local / regional / national / transnational).

- The role and prerogatives of actors vary according to the types of transport / infrastructure.

- Border "creates distances in proximity" but also generates mobility (e.g. cross-border commuters)

Links with mobility issues

- The institutional fragmentation of the transportation system is an obstacle for a integrated mobility offer.

- Borders may imply differences in terms of policies (objectives, budget), laws and norms, materials, priorities, institutional structures, images of transport, practices, etc.

Trend 1: Decarbonisation

Transport is mainly based on carbon which leads to greenhouse gazes emissions and regional air pollutions.

The transition towards a low carbon mobility will be based on the following axes:

Improve

- Making the current transportation system more efficient, reducing its environment impacts

- Technological solutions (e.g. electrification of cars)

- Does not address the causes of mobility, risk of rebound effects (more mobility)

Shift

- Transfering users from cars to transit and to active mobility (walking and (e-)cycling); Financial incentives, infrastructures (bicycle networks) and supply (e.g. timetable), planning, etc.

Avoid

- Reducing the need for mobility; Focus on proximity rather than distance and speed; Redefinition of lifestyles

Trend 2: Integrated mobility

To reduce the automobile dependence, the alternative modes have to be integrated (i.e. transit, cycling, bike-sharing, car-sharing, carpooling, taxi, transport on demand, walking, etc.).

This trend refers to the idea of an "ecosystem of mobility" or more frequently what is called "Mobility as a Service" (MAAS).

MAAS highlights the shift from a mobility based on the ownership of a private car to the consumption of mobility services.

This refers as well to intermodality (use of several modes during the same journey) and multimodality (use of various modes depending the day, the destination, etc.)

The integration of mobility services is of several kinds:

- Physical (connection between boat and train, bike and train, etc.)

- Ticketing (payment system, harmonisation between regions and countries)

- Organizational (timetable, annual pass, etc.)

- Digital (Apps, websites)

- One ticket / pass for all services

Trend 3: Planning a post-car world

Mobility policy is not restricted to transport. It relates to urban and regional planning and the way housing, jobs and activities (including leisure and tourism) are spatially organised.

Automobile dependence is also the consequence of the way space has been planned over the last decades (separation of urban functions, accessibility by car as an objective, etc.).

Sustainable modes of transportation have to become the easiest and most desirable options. The way space is organised is a key dimension. This relates to:

- Infrastructures for cycling, walking and public transport

- Urban form (density, mixed-use, compacity, nature, etc.)

- Car restriction (speed limits, road, parking spaces, etc.)

- Planning according to the accessibility to cycling, walking and public transport. Cf. the concepts of 5-minutes city (Copenhagen), 15-minutes city (Paris), etc.

Trend 4: "Slow" tourism

Tourism is a major driver for mobility and is one of the most visible expressions of globalisation (in terms of destinations, of customers' origins, geographical imaginaries).

Italy and Croatia are and will be key touristic destinations due to their amenities (cultural, natural, etc.) and their location in Europe.

Sustainable mobility applied to tourism could refer to:

- The trip towards Northern Italy and Croatia: the renaissance of night trains in some European countries could be an opportunity for the region. They would cover an important potential market.

- The trips within the region (including cross-border journeys): promotion of sustainable mobility (e.g. to facilitate tourism without the private car), cross-border bike holidays, etc.

Trends & Scenarios of Public Transport and ICT
Prof. Giovanni Longo University of Trieste

Trend 1: Demand Increase

A general increase in world population (up to 9.8 billions in 2050) and in urbanization is commonly forecasted, thus leading to the growth of "megacities" with millions of inhabitants

Economic (GDP) growth also contributes to demand increase (average annual growth rate 2,6 for the period 2020-2050).

T2: Need for sustainability

Around 27% world energy consumption by transport sector

23% greenhouse gas emissions derive from the transport sector

Trend 3: New approaches

Trend 4: New technologies

In technical literature, three main trends are commonly identified:

- Electrification

- Connectivity

- Autonomy

Independent vs. combined development?

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Trend 3 - FOCUS: New technologies

A. Electrification

- Rapid Technological improvements (especially in battery) – Cost reduction

- Reduction of noise, greenhouse and air pollutant emissions (at least locally)

- Increase in EV choice and performance

- Supportive government policies

- Need for infrastructure (for example power availability and charging points)

- Not only cars, but also scooters, bike, … and busses

B. Connectivity

- Thanks to technological improvements, cars evolve to become a sort of "computers on wheels"

- Increase of safety, convenience, on board experience and usage of time (in combination with "Autonomy")

- Improvement of maintenance and fleet management

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Trend 3 - FOCUS: New technologies

C. Autonomy

Together with Connectivity, autonomous vehicles can lead to:

- Improve road and traffic management to (hopefully) reduce congestion

- Increase productivity and on-board experience

- Reduce the need for parking lots

- Offer independent mobility to specific groups (young and elderly people)

- Reduce the total number of cars

- Increase the number of trips and the travelled distances

- Implications for cyber security…

Anyway, no one seems to doubt that, in the long run, CAV will replace human operated vehicles

Trend 3 - FOCUS: New technologies

D. Sharing mobility

It may be defined as a transportation strategy that enables users to gain short-term access to transportation modes on an "as-needed" basis.

The growth in "shared mobility" parallels the more general trend towards shared marketplaces for instance in the hospitality sector and in household and gardening tools. The following three factors have been identified as critical for the success of such shared marketplaces: the establishment of trust, the provision of peer review, and the swift fulfilment of needs. As we shall see below, Internet technologies and mobile apps have played a key role in each of these factors.

The key promise of the sharing economy is a more efficient utilization and monetization of assets that are not used to their maximum capacity. "Cars, as expensive household line items with low daily usage rates, are prime for this." (ITS America 2015)

Different options exist, including the so called "micromobility"

Trend 4 - FOCUS: New approaches

A. Mobility as a Service (MaaS)

Mobility-as-a-Service is an evolving concept: from vehicle ownership towards service-based transport. In this sense, MaaS includes multi-modal aggregation of transport modes as well as on-demand mobility.

This is something more than only travelling on different transport modes or providers by using only one ticket/payment method (this solution already exists mainly in the field of public transport)

From system perspective, there is the need for a balance between the user convenience and the related optimal choice on one side and, on the other side, collective objectives like environmental benefits, health, quality of life, economic growth, social inclusion, space optimization, …

Trends: Possible scenarios

A. Business as usual

System evolution follows its trend without any specific disruption

B. Global Chaos

Financial instability, negative economic growth, weather extreme events with increasing and visible impacts, conflicts – fuel price increase and deterioration of transport system

C. Tech Triumph

Complete operation of new technologies – safety improved and need for new infrastructures

D. Gentle Footprint

Low-impact life choices, reduction in energy consumption, sustainability.

Trends: Future of Public Transport

Given the above-mentioned general trends, which will be the effects on public transit? Which could be its future? Some studies exist, but at present there is the need for further investigation on many items

A. Vehicles/Fleet

Due to government supportive policies and heavy communication messages, the trend is oriented to other powertrain options than traditional (Electric/Hybrid) even if from technological perspective these solutions seem to be (at present) far from maturity

Different and sometimes not completely knows performances (especially over time) will require changes in vehicle/timetable operations and perhaps will increase service costs.

B. Information and ticketing

New smart solution to purchase ticket and provide information will definitely increase transit quality perception (and therefore share).

Trends: Future of Public Transport

C. Infrastructure and Depots

New powertrain solutions will imply different needs in terms of infrastructure and depots. System power availability should be verified in order to better manage charging procedures together with vehicle scheduling and charging points should be defined accordingly.

Additional issues are related to incident management (both on-site with specific procedures and off-site with specific safety requirements). Changing powertrain does not imply only ordering different types of busses…

D. Role in the system

This is the most important issue while discussing about the future of public transport in the context of these disruptive mobility changes or scenarios.

The answer strongly depends on specific land use and transport situations: (1) Urban or sub-urban long-distance services; (2) Type, dimension and population density of the city: (3) Actual configuration of transport network and modal share (low–high–very high transit/bike/foot mode share)

And it should derive from a strategic vision and corresponding panning actions in transport system development and management

Trends: Planning issues

A. Global System perspective

Re-thing the system towards a new mobility scheme. This will involve other sub-systems than only transport (land use, energy, economic, real estate, social, financial, …)

B. Transport System perspective

Integration vs. competition between public transport and other individual motorized transport modes?

Transit must be one of the options in MaaS architecture especially on crowded directions and corridors where replacing it with other solutions is unfeasible due to capacity constrains. Other solutions may perform definitely better than traditional transit on less dense areas thus leading to a reduction in the use of private cars towards more efficient and sustainable transport modes.

C. Mobility management

Interventions are needed to find the equilibrium between user and system optimum

Trends: Conclusions

Apart from very extreme scenarios, actual mobility trends and changes will allow people to travel more efficiently, more cheaply, more often, and in different ways. But the future is not definitely set, and there is a strong role for the public and private sectors to help avoid pitfalls associated with increased congestion, air- quality concerns, and other potential negative outcomes.

It is likely that the beneficial impacts will only be fully captured if autonomous vehicles are integrated in a "shared mobility" business model and if they are complemented by high-capacity transit systems.

It is a great opportunity to improve the quality of life—day in, day out—for billions of people.

There is the need to prepare for the future, not wait for it.

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