NEWBITS presents high-level evidence-based recommendations to boost innovation diffusion in the ITS sector

March 2019

Within the framework of the H2020 project NEWBITS (New Business Models for ITS), a benchmark analysis of ITS innovation diffusion[i] processes between Europe and the United States was performed to ground **an evidence-based categorisation of success determinants and barriers** affecting ITS deployment as well as to formulate key **recommendations** for successful technology transferability.

The analysis was informed by an extensive review of project-based case studies and local deployment initiatives undertaken across Europe and in the United States, specifically addressing the following **innovation areas**:

- ✓ **Sharing Mobility[ii]**,
- ✓ **Mobility-as-a-Service**, and
- ✓ **Connected and Autonomous Vehicles**.

This policy-oriented paper presents high-level recommendations to boost innovation diffusion in the ITS sector, whilst for methodological aspects and detailed insights on success factors and barriers to deployment refer to NEWBITS Deliverable 3.2 Benchmarking ITS innovation diffusion and ITS production processes EU vs. US.

Sharing mobility

The emergence of attitudes towards sharing a product or consuming a service in replacement of ownership and purchases has both a social and economic dimension, since it provides users with increased convenience and improved access to certain products and services. Within the mobility sector, sharing forms of mobility have the direct beneficial effects of reducing car ownership and usage, therefore contributing to reduce traffic congestion within cities; the use of these types of mobility services are being pushed by the belief that cars are an underused and under-optimised asset, by the large city space required to accommodate parking demands and the low levels of vehicle occupancy realised during commuting trips. A compendium of barriers and suggested actions to overcome them are suggested below for each sharing mobility solution addressed.

Barrier	Recommendation to overcome barrier	Car-sharing	Ride-sharing	Ride-sourcing	Bike-sharing
Financial support	Local funds from city governments and transport authorities could facilitate market expansion strategies. Using infrastructure investments to fund ride-sharing platforms as well as investing in cycling infrastructure and emerging technologies can act as catalysts of innovation diffusion.	✓	✓		✓

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Barrier	Recommendation to overcome barrier	Car-sharing	Ride-sharing	Ride-sourcing	Bike-sharing
Lack of awareness and trust	Awareness raising programs should promote car-/ride-sharing and bike-sharing as alternatives to replace private car trips, focusing on associated health and economic benefits. User recruitment through trusted channels (i.e. companies, universities) should aim to build a community of trust with people sharing same destinations.	✓	✓		✓
Lack of parking spaces	Local authorities should release parking spaces at a discounted cost or for free; the lost revenue would be offset by annual fees paid by providers or by public funds saved from not investing public money in road infrastructure measures to achieve congestion reduction.	✓			
Lack of policy support	Local authorities should require that private developers provide car spaces specifically allocated to car-sharers to allow staff and visitors to travel more sustainably to/from employment sites; local authorities should also support employers financially to establish fleet-sharing agreements with private operators. Measures like extending pre-tax benefits to ride-sharing (relating to parking, public transport passes), tax incentives for ride-sharers, High Occupancy Vehicle (HOV) lanes, lower toll prices for HOV will favour ride-sharing as a valid complement to other equally sustainable forms of transport. Comprehensive cycle planning strategies should be developed by local governments as well as regional bike planning approaches aiming at connecting together the whole cycle network across different municipalities.	✓	✓	✓	✓
Critical mass	Interoperability among ride-sharing databases and standards should be fostered to enhance open source data sharing amongst ride-sharing platforms; additional measures could also be to target young commuters and deploy a ride-sharing service along congested routes into the city.		✓		
Synergy building between local authorities and commercial providers	Framework agreements between policy makers and on-demand car service providers to incentivise use of commercial platform and help achieve sustainable mobility targets set out by local governments. Interoperability among on-demand services databases and standards		✓	✓	

Barrier	Recommendation to overcome barrier	Car-sharing	Ride-sharing	Ride-sourcing	Bike-sharing
	should be fostered to develop a synergy building effect. Local authorities should incentivise the data sharing process by enforcing taxi companies to publish taxi trip and fare data and encouraging private operators to do the same.				
Legislation and regulatory approaches	On-demand services should be legitimised by regulations; tax incentives for ride-sharers may also facilitate expansion strategies. Extending pre-tax benefits could serve as an appeal to employers. A key example of this is the Cycle to Work scheme in the UK, which while promoting healthier journeys to work and reducing environmental pollution, it allows employers to loan cycles and cyclists' safety equipment to employees as a tax-free benefit.			✓	✓

Mobility as a Service

According to Kamargianni et al. (2015)[iii], a natural progress of multi-modal travel planning applications is represented by MaaS, which can be defined as: "The term "Mobility as a Service" stands for buying mobility services based on consumers' needs instead of buying the means of transport. Via "Mobility as a Service" systems consumers can buy mobility services that are provided by the same or different operators by using just one platform and a single payment. The platform provides an intermodal journey planner (providing combinations of different transport modes: car-sharing, car rental, underground, rail, bus, bike-sharing, taxi), a booking system, a single payment method (single payment for all transport modes), and real-time information. MaaS users can use the Service either as Pay-As-You-Go or they can purchase mobility packages based on their or their family's needs".

The MaaS ecosystem is made up of many actors, i.e. customers, mobility management players, telecommunication companies, payment processors, public and private transport providers, MaaS provider, data providers and local authorities with responsibilities in city planning and transport planning, who strive together for a holistic, integrated mobility ecosystem.

NEWBITS has formulated preliminary high-level recommendations to accelerate the diffusion of MaaS innovations across European and US markets.

Barrier	Recommendation to overcome barrier
Legislation and regulation	Ensure that transparent market conditions, transport service purchase, subsidisation procedures develop to benefit MaaS operator businesses

Barrier	Recommendation to overcome barrier
Technical barriers	Support development of open interfaces, global interoperability and ensure necessary infrastructure for MaaS operation is in place
Financial barrier	Design instruments to finance new MaaS-related business and support international investments into MaaS solutions
User acceptance	Collect feedback and needs from users, develop awareness campaigns and provide users incentives.
Human-related	Ensure that proactive discussions and collaboration among stakeholders are always encouraged in order for a MaaS ecosystem to evolve
Lack of human expertise	Both public and private entities need to access capacity building programmes for technical and administrative staff participating in MaaS

Connected and Autonomous Vehicles

Connected and Autonomous Vehicles (CAV's) incorporate a range of increasing connectivity technologies allowing vehicles to communicate with each other and the surrounding environment and provide valuable information about road, traffic and weather conditions.

The Society of Automotive Engineers (SAE) has come up with a taxonomy and classification system for autonomous vehicles, with levels 0 – 5, with 0 and 5 being 'no automation' and 'full automation' respectively; the four key stages of technology on the autonomy roadmap are often referred to as feet off (SAE level 1), hands off (SAE level 2), eyes off (SAE level 3), brain off (SAE levels 4 and 5).

Preliminary high-level recommendations to boost innovation diffusion of CAV's were formulated.

Barrier	Recommendation to overcome barrier
User acceptance	To establish a safety track records (as part of on-going pilots) as users are more interested in advanced safety applications
Willingness to pay	Despite increasing users' interest in CAV's, there is a significantly decreased willingness to pay from both EU and US consumers, therefore costs must be improved and consensus building on CAV's developed
Data protection and cyber-security	Establishment of a precise set of rules for personal data exchange and sharing with third parties. Regulators must ensure that all testing activities for CAV's must comply with General Data Protection Regulation (GDPR) and that any data collected or scenarios where individuals can be identified are stringently regulated.

Barrier	Recommendation to overcome barrier
Technology barrier	Standardisation bodies must develop technical standards for CAV's, whilst Government bodies should develop national frameworks providing technological and operational conditions to develop integrated and interoperable CAV systems.
Lack of interest/priority action from policy makers	Dedicated training and awareness raising programmes on CAV benefits to inform policy makers, alongside development of guidelines for strategic city mobility planning, must be prioritised.
Regulatory issues	Regulators should mandate deployment of technologies, define open technology standards to accelerate diffusion of CAV's.
Lack of human resources	Capacity building in both the public and private domain must strongly be encouraged.
Public funding	Large scale public demonstrations to cover all range of operational scenarios should be funded by local governments and/or established through Public-Private Partnerships.

To find out more about NEWBITS visit www.newbits-project.eu, follow the project on Twitter (@NEWBITS_CITS) and register on the NEWBITS Network Platform, a novel ITS collaboration platform on https://newbits.eu/.

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[i] **Innovation diffusion** can be defined as: "the process by which an innovation is communicated through certain channels over time among the members of a social system. Diffusion is a special type of communication concerned with the spread of messages that are perceived as new ideas. […] Diffusion has a special character because of the newness of the idea in the message content" (Rogers E.M., 2003).
[ii] **Sharing mobility** here includes car-sharing, ride-sharing, on-demand ride-sourcing through apps such as Uber, Lyft, MyTaxi, etc. and bike-sharing.
[iii] Kamargianni, M., Matyas, M., Li, W. & Schäfer, A. (2015) Feasibility study for "Mobility as a Service" concept in London.