



D 5.3 High Level European Deployment Scenarios

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1 Introduction

1.1 About TIDE

TIDE (Transport Innovation Deployment for Europe) is a project with an aim to enhance a broad transfer and take-up of innovative urban transport and mobility measures throughout Europe and to make a visible contribution to establish them as mainstream measures. TIDE focuses on 15 innovative measures in five thematic clusters: “New pricing measures”, “Non-motorised transport”, “Advanced network and traffic management to support traveller information”, “Electric mobility” and “Public transport organisation”. TIDE is funded by the European Commission’s DG Research and Innovation under the 7th Framework Programme for Research and Development.

1.2 Purpose of the document and how to use it

The purpose of this document is to provide policy recommendations at a European and national level on how to foster deployment of urban transport innovation. Particularly targeted actors are the European Institutions, European and national associations, industry and the non-governmental sector. The key question is how to create favourable conditions for the take-up of innovative urban transport solutions.

The recommendations are given on a general level and in greater detail in relation to the five pre-specified thematic TIDE clusters.

Chapter 2 – Fostering take-up of innovation – a multi-actor task– gives a short introduction to the pragmatic definition of innovation largely followed by TIDE and how the complexity of the urban transport system can be taken into account in the deployment process.

Chapter 3 – General conclusions – summons the experts recommendations on how to foster the innovation on a general level.

Chapter 4 – Recommendations per thematic cluster – gives recommendations on how to foster innovation from a high level perspective in greater detail and in relation to each of the five thematic clusters of TIDE. The section ends with tables summarising drivers, barriers and recommendations of all five clusters and cross-cluster correlations of the measures.

1.3 Empirical foundation

The recommendations and general conclusions are based on the experiences of European experts within the five specified thematic areas (the TIDE clusters) and generalists on urban transport innovation. They also take into account common and recurring challenges faced by TIDE- cities in their own experiences of

implementation of innovative measures. The workshops were held in Brussels in February 2015. For a list of all workshop participants, see **Annex 1**.

Furthermore, the general conclusions are also based on a survey on "how to improve research and deployment on urban transport innovation", distributed in December/January 2014/2015 to a total of 97 European professionals with expertise in at least one of the five thematic clusters. 22 experts, representing consultancies, research institutes, local and national governments, universities, and industry answered the survey. The respondents were of eleven different nationalities.¹

In the review process of this report, the cluster leaders were asked to give their opinion on how the different measures are interrelated and might reinforce one another. Three out of five clusters participated in this exercise.

As a part of the analysis of how deployment can be supported by high level actors, the barriers identified in the workshop and survey of 2015 is contrasted to how experts identified barriers to the same innovative TIDE measures in the spring of 2013. The barriers identified in 2013 are presented in the TIDE report D1.1 Selection of Innovative Measures, March 2013.

All conclusions and recommendations are also based on the current state-of-play of European policies. Each of the thematic clusters includes a section on EU policies relevant to the cluster theme.

¹ Germany, Sweden, Belgium, Hungary, Italy, United Kingdom, Austria, France, Netherlands, Switzerland and Turkey

2 Fostering take-up of innovation – a multi-actor task

The TIDE project was initiated under the Seventh Framework Programme for Research and Technological Development (FP7)², under the specific programme 'Cooperation' and Research theme: 'Transport'.

Innovation is an important concept in research funded under the FP7, which differs from previous Framework Programs by centring on *innovation and knowledge for growth*.

In TIDE, an innovation is defined as:

'An idea, practice or object that is perceived as new by an individual or other unit of adoption AND provides a better solution to existing challenges than traditional measures in urban transport and mobility.'

TIDE focuses on 15 innovative urban transport measures (innovative measures). Each of these innovative measures is somewhat established in one/or a few European countries, but completely new to large parts of Europe.

All innovative measures under TIDE's spotlight are examples of new and feasible solutions with the potential to affect key challenges of urban transport such as energy efficiency, decarbonisation, demographic change, safety, access for all and new economic and financial conditions. When implemented, they all will be part of a socio-technological system and their deployment will have both behavioural and environmental impacts.

The complexity of these innovations is not primarily based on the actual ideas, practices or objects (even though some of the innovative measures in focus are indeed quite complex). The great complexity that follows the implementation and deployment of these innovations has to do with the systems in which they are introduced, alter and affect.

European institutions, European and national associations, the industry and non-governmental sector who wish to enhance the deployment of the type of innovative measures in focus in TIDE can benefit greatly by a systematic, multi-actor, or network approach to deployment.

² FP7 was a European Research and Innovation funding program between 2007 and 2013.

In Innovation Management, the process of System innovation is seen as:

“...a multi-actor process that entails interactions between firms, consumers, policymakers, universities, supply chain actors, societal groups, media etc.”³

Embracing a multi-actor perspective is essential in understanding how an innovation is introduced and taken up by a growing amount of stakeholders. Policymakers need to invite all involved actors to work together through strategic public-private partnerships, demonstration projects, scenario workshops, vision building, public debates, and network management.⁴

In member states that are in the earlier phases of diffusion, the role of the policymaker is often to facilitate, stimulate and act as a chain manager. In member states that are in later phases of diffusion – when some clarity is reached about the market demand and other infrastructural changes needed – policy instruments such as regulations, standards, taxes, subsidies and financial incentives are used to enhance deployment and uptake.⁵

The importance of a multi-actor, or network perspective in Deployment Policy was underlined by the IEA (International Energy Association)⁶ in a project studying successful examples in the field of developing markets for more efficient energy or for the introduction of renewable fuels, a field that has many parallels to urban transport.

The IEA (International Energy Association) Secretariat states :

“Successful deployment begins by identifying the interests of many stakeholders and bringing them together to work for accelerated dissemination of a technology as well as improved performance and lower costs.”⁷

In the study, the IEA emphasised the importance of a coherent and/or a demand-driven approach. They find that measures motivated by energy policy considerations seem to be much more acceptable when they are also in line with policies for industrial development, environmental improvement and employment

³ Deák and Peredy, Journal of Innovation Management, 2015

⁴ ibid

⁵ ibid

⁶ The IEA (International Energy Association) is a Paris-based autonomous intergovernmental organization established in the framework of the Organisation for Economic Co-operation and Development (OECD) in 1974 in the wake of the 1973 oil crisis. Today the IEA acts as a policy adviser to its 29 member countries and beyond. The IEA has four main areas of focus: energy security, economic development, environmental awareness and engagement worldwide.

⁷ Nilsson and Wene, IEA, 2001

which emphasise the importance of a coherent approach with cooperation between the perspectives of traditional policy fields.

The IEA study also concludes that the supposed customers seldom are driven by energy issues per se. Hence, it is important to see to it that the innovation is packaged with features the customers do care about. In forming policy to foster deployment, a demand-driven approach that invites supposed consumers into the development process is a way to enhance deployment and to adjust the packaging on a specific innovative measure to fit the condition of particular regions or member states.

3 General conclusions

The following sections are based on expert testimonies from TIDE Work Package 5 activities (see 1.3). The recommendations of the specific thematic clusters presented in chapter 4 are taken to a general level in an aim to answer the following questions:

- Which are the right context conditions for deployment of urban transport innovation? (3.1)
- How can European Institutions, European and national associations, industry and the non-governmental sector contribute, and/or be encouraged to contribute, to the formation of such conditions? (3.2)
- Which are the recurring barriers that represent a challenge when implementing innovative measures? (3.3)

Linking to the science of Managing System innovation in chapter 2, the section is closed by a discussion on if and how the systemic approach is relevant to the designated innovation measures (3.4).

3.1 The right context conditions for deployment of innovation

Political acceptance and support for an innovative measure can be a good driver since political power often is connected to many of the other frameworks that are important to break barriers and enhance deployment.

Public acceptance of an innovative measure is important, both in itself and in its close connection to political support.

Access to financial support is another condition that can help in driving deployment. Financial support usually comes from politically initiated development funds or through direct political initiatives.

Clarity in political intentions and decisions creates a context in which actors and interest groups to a greater extent can risk investments in uncertain terrains.

Coherency in legal frameworks on all relevant levels is essential for some innovative measures. For others it is more a factor in enhancing the spread and deployment of the innovative measure.

Access to ‘best practice’ studies and guidelines directed at a specific innovative measure can enhance deployment of that innovation.

Established standards, on a national or European level, can expand the market for an innovation and provide security for investment.

Relationships between stakeholders on “the same level” who share knowledge and experiences and/or cooperate to enhance deployment.

Relationships between stakeholders on “different levels”, and, perhaps, with different interests, to increase the collective understanding of the innovative measure from their respective point of view, in order to enhance deployment through the right adjustments.

Access to and protection of relevant data is a key condition for some of the innovative measures. Protection of relevant data can be seen both as an obstacle and a necessity in order to make it accessible.

Viable business models are crucial for deployment of many innovative measures.

3.2 Ways to get there

Political acceptance and support can be reached in many ways. One way of showing the potential of an innovative measure is through *pilot trials* which can prove to the politicians that the measure is effective and at the same time give the public time to act and react on the measure. The public opinion of an innovative measure can then be collected through the use of marketing research tools. Knowing the public and other stakeholders’ response to a measure makes it easier for politicians to form an opinion and risk the supporting of a more large-scale introduction and deployment.

Informing politicians about already proven effects and advantages of a measure is another often suggested method to reach political acceptance that in some cases can be very inexpensive, at least in comparison to large scale trials. Hence it is a method available to stakeholders and interest groups on most levels. Information can take many forms reaching from *distribution of facts and research material about the added value of the measure* to *study tours*. Some experts point out that the information which political actors are most receptive to is a clear statement of *“the link between the innovative measure and the expected effects on society on a cost-benefit analysis”*.

To increase their stakes, *interest groups and stakeholders can come together* and make joint attempts to draw politician’s interest by finding allies, either in the same city or at a national or European scale.

The attempt to convince politicians about the value of an innovative measure can come from the outside, but it can also be the case that a group of politicians are interested in convincing their colleagues and political opponents. The preferred method naturally depends on the position of the actor. A way for the European Union and member states to work for political acceptance and support these innovative measures is to *keep prioritising urban transport innovation in the policy work* and to *support politicians on lower levels* in their aim to do the same.

Public acceptance of a measure can be influenced through *information and communication* – preferably before or early in the implementation process. As for political acceptance, public acceptance can be increased by *pilot trials* giving the public a chance to experience the measure, and maybe also to take part in the refinement of the measure.

The so-called “*living labs*” are also a way of trying out measures in their thought context before big scale introduction and by doing so both increasing the public acceptance for innovative measures that works and let the public take part in the refinement which in turn will help deployment in the next phase.

“*Pilot cities*” that want to change a few aspects fundamentally are also suggested as a way of influencing public opinion and deployment. Experience shows that where this model has been used, innovation was prepared for larger take-up at the end of the trial.

Public acceptance can also be strengthened by a legal framework taking the consumer perspective into account. In connection to the innovative measures of TIDE, this is often linked to a *framework for data privacy*.

Access to financial support is often strongly connected to political support, but it is also regularly mentioned in terms of indirect political support through different kinds of *development programs* on a European or national level. The less tried an innovative measure is, the higher the risk on the financing part. Hence, European and national policy makers can enhance deployment of innovative measures by allocating funds and see to that urban transport measures are at least covered by structural funds, or even stated as a condition for funding and by allowing a greater degree of economical risk-taking in the support of very innovative but yet untried measures.

Clarity in political intentions and decisions ought to be a goal for all political actors. To enhance deployment of some of the innovative measures in TIDE, policymakers on a European level can use *policy instruments to steer technological development through long term targets and goals* and by making sure that set targets (such as CO₂ emissions, quality of life etc.) are in fact reflected in their own policy work.

Coherency in legal frameworks on all relevant levels can be gained by the implementation of directives and legislative work on a European and/or national level.

Access to ‘best practice’ studies and guidelines presupposes development of relevant information, summoning and distributing of the same. Hence, a way to satisfy the demand for ‘best practice’ studies and guidelines is for European and national actors to finance and coordinate this access.

Established standards should be handled and developed on a European and national level.

Relationships between stakeholders on “the same level” can be developed through the *creation and support of city or intra-city (or municipal) networks* and hence ease dissemination and experiences sharing. European and national actors can play an important role either by leading such networks or by supporting them financially.

Relationships between stakeholders on “different levels” with relation to the same innovative measure but from different perspectives can be created and developed through *networks* – preferably financially supported by a European or national level.

Access to and protection of relevant data can be secured by the development of policies and standards on a European and national level.

Viable business models can be secured by including such a perspective in the measures taken to support deployment of innovation.

3.3 Barriers to overcome

Creating the right conditions is also about handling unavoidable barriers. Given the nature of urban transport, the barriers of the innovative TIDE measures are of many kinds, such as institutional, technical and behavioural to name a few. Many of the barriers mentioned below are in fact already mentioned in the sections above as important aspect in creating the right context conditions. It is quite natural that the same factor that if “turned right” constitutes the right context condition for a measure, but becomes an obstacle that has to be tackled properly when turned the other way around.

Political will is an important condition, hence its lack might represent a real problem. Political timing can be a barrier since politicians can be reluctant to invest in new and uncertain measures in pre-election phases. Known costs in combination with uncertain benefits is also a factor that can influence the political will and hence be a barrier.

Public opinion is, when it is not in favour of a specific innovation, an important barrier in itself and in close connection to political support.

Local circumstances can constitute a barrier to deployment when circumstances differ between cities and regions (which is often the case in

Europe). Local circumstances which constitute a barrier can take on any form but are usually mentioned as legal or organisational barriers.

Legal barriers, common to most of the European member states, are often related to transparency of business intelligence and access to corporately owned data. Law related to privacy and user data security are also found to be barriers by some clusters.

Different legal and financial contexts on different levels can hinder, or even stop, deployment of innovative measures.

Lack of flexibility in governance structure can make systems rigid and deployment more difficult.

Standard practises in policy and transport planning can constitute a barrier for innovation and deployment since it is always to some extent built upon and around preventing behaviours and set-up preventive measures and hence risk missing new and alternative behavioural patterns.

System inherit barriers are specific to every innovative measure. One example of a barrier that occurs in deployment of most innovative measures is that although the innovation might benefit to society as a whole, there will always be winners and losers in any system change. The fact that some actors are, or perceive themselves to be, losers constitutes a barrier.

The infrastructure “catch-22”: There is reluctance to invest in the infrastructure of a mean of transportation if the modal share is low. And it is hard to raise the modal share without infrastructural investments. This constitutes a barrier for all new and existing modes of transportation which have a potential to play a much more important role as a mean of transport if only the infrastructure were in place.

Lack of standards can make markets and investors more uncertain.

Too many standards can be a barrier by causing heavy bureaucracy.

Conflicting interests between user groups or suppliers in favour of different modes of transportation constitutes a barrier to one another. The “battle for public space” is an example of how such conflicts can be expressed in practise.

3.4 A System innovation perspective

In general, the expert recommendations in this report have a top-down approach on how to foster deployment. Policymakers on a European or national level are encouraged to prioritise the field of urban transport in their policies and funds, collect and spread information, provide guidelines and set standards to facilitate the work of local actors.

Given the objective of this report, *i.e.* to make recommendations to high level actors on how to foster deployment, a top-down approach might seem natural. However, the fact that the targets for the recommendations are high level does not necessarily have to stand in the way of recommendations containing a more bottom-up approach, or multi-actor network assumption on how knowledge, behaviours and information are spread.

Two of the recommended ways (in 3.2) to reach the right context conditions (in 3.1) which are especially interesting from a system perspective of innovation are *financing of small or large scale pilot trials* and the *support of the creation of networks and cooperation between local actors*.

Experts from three out of the five thematic clusters suggest support of local networks (Cluster 1 and 3) or support of local cooperation (Cluster 5) as a way to foster deployment. Support can be strictly financial and tied to more or less strict agendas on how these networks and cooperation should be organised, or how support can become an active involvement or even taking a leading part in such networks and relations.

High level actor support of *pilot trials*, *pilot cities* or *living labs* are suggested as methods which gains deployment by experts in the thematic clusters 1, 2, 3, and 5. These kinds of real life executive tests of innovation are very interesting from a system perspective of innovation since they affect and involve all relevant actors groups at the same time with no one left behind. There is much to gain by such a method. From an *innovation-developmental-perspective*, these kinds of pilot studies allow feedbacks from all actors to be collected at once and then be used in altering the innovation even further which, in turn, will gain deployment. From a *knowledge-development-perspective*, these studies give all actors insights not only into the pros and cons of the innovative measure seen from their own perspective, but often also into the usefulness of the innovative measure of others which lay the foundation of *acceptance*.

4 Recommendations per thematic cluster

In this chapter high level policy recommendations are given in greater detail. Each section deals with one innovative theme and ends with a set of recommendations to stakeholders with an interest to support the spread and deployment of the appointed innovations from a European or national level.

For each innovative theme, *the measures' role in a vision of future urban transport* is stated followed by identified *drivers* and *barriers*.

The chapter ends with a summary of the barriers and recommendations identified in all clusters followed by a discussion on possible correlations and reinforcements between the measures studied in the different thematic clusters.

The measures of each cluster are not described in detail in this report. For more detailed information about the appointed innovative measures and thematic clusters, please see the TIDE website.⁸

4.1 New pricing measures

Appointed innovative measures are:

- *Road user charging in urban areas*
- *Parking charge policy*

The measures' role in a vision of future urban transport

Pricing has a potential of playing an important role as a tool in future urban transport policy.

In *road user charging* – the right pricing measures can reduce congestion and even generate revenues. The revenues, in turn, can be used to promote or create incentives to change the mode of transportation from car to a more sustainable mode. A policy that allows sophisticated *parking pricing*, that reflect the demand for parking, can have similar effects.

The purpose of a charging system, however, is not always to generate revenue. Another aim can be to design a system which reflects the real costs of society, and therefore yield a more efficient use of the transport system.

Since the effects of these innovative measures will differ greatly depending on the context, it is important that both direct and plausible indirect effects are reflected upon in the assessment of a potential introduction.

⁸ <http://www.tide-innovation.eu/en/>

Drivers

City shortage of funds is a driver for pricing measures. Pricing measures are attractive since they can generate revenue to cities.

Increased congestion is a growing problem in many European cities that can be seen as a driver for pricing measures.

A new paradigm in land use as cities can redesign and/or reorganise their public space. Traditionally, road traffic has been a protected and prioritised system, but lately an increasing number of cities are restructuring public spaces in order to reduce the number of cars and parking lots. This is a driver towards an active use of parking charge policies.

Transport is increasingly seen as a good by professional transport planners, rather than a service. If this way of thinking about transport is adopted by the public, it may lead to an acceptance of pricing mechanisms in urban areas.

Barriers

The experts' view on the barriers of implementation of new pricing measures is for the most part unchanged since 2013 when measures were first identified in TIDE.

In 2013, the identified barriers were categorised as 'political reasons' (30), 'societal acceptance' (27), 'strong lobby groups' (6), 'technical difficulties' (5), 'complex co-operation' (3), 'insufficient funds' (3) and 'lack of EU examples' (2).⁹

The two most mentioned barriers of 2013, 'political reasons' and 'societal acceptance', remain identified as crucial in 2015 (even though here they are specified as public opinion, local legal foundation and political will). Complexity is another barrier mentioned both 2013 and 2015. In all, there are two barriers identified in 2013 that cannot be seen as a version of any of the barriers identified in 2015. These are 'strong lobby groups' and 'technical difficulties'. In turn, 'complexity' was identified as an important barrier in 2015, but only mentioned by a few experts in 2013.

The following paragraphs summons the barriers identified by experts 2015:

System inherit barriers can be found in both road and parking charging systems. For instance:

- The complexity of these systems makes them hard to "understand". This impedes the transparency and makes the effects difficult to measure.
- As in any system change, there will be people and businesses who find themselves to be losers when pricing measures are applied or changed

⁹ Number in parenthesis indicates number of times each barrier was mentioned by the experts in connection to any of the identified measures 2013

- The market of parking is complex with both private and public actors offering parking lots.

Public opinion is important. Lack of sufficient information, trust and acceptance in pricing measures are barriers in the introduction of pricing measures.

Political will can be a function of public opinion. Lack of public acceptance makes politicians, who suggest or introduce a road pricing scheme, face the risk not being re-elected.

Local circumstances shape the conditions for deployment. In some European countries, laws and legal framework make it difficult to introduce urban road user charging. In other cases, neighbouring cities are in competition. In these cases – if the cities don't cooperate – pricing can be misleading the will to change citizens' mode of transportation.

EU Policy Relevance

The EU has made internalization of external costs of transport as one of the main principles in transport policy. The basis of the current activities is the 2008 EC Greening Transport Package (COM/2008/0433), including a Strategy for the Internalisation of External costs (COM/2008/0435). With regards to urban pricing schemes, the latter document refers directly the Action Plan on Urban Mobility (COM/2009/490). The Action Plan on Urban Mobility's (APUM) Action 12¹⁰— Study on urban aspects of the internalisation of external costs and Action 13 — Information exchange on urban pricing schemes¹¹— relate directly to this TIDE measure.

The 2011 Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system (Transport White Paper (TWP) – COM (2011) 144) commits in its action 32 - an EU framework for urban road user charging to develop a validated framework for urban road user charging and access restriction schemes and their applications, including a legal and validated operational and technical framework covering vehicle and infrastructure applications. A consultation by the European Commission on the midterm review of the White Paper on Transport was published in spring 2015, for which stakeholders are awaiting for the results.

New pricing measures hence were addressed in December 2013 by the

¹⁰ Results of the study are due to be published early 2013.

¹¹ European commission June 2015 (1) and www.accessrestriction.eu June 2015

publication by the European Commission of the Urban Mobility Package¹², containing a communication “Together towards competitive and resource efficient urban mobility”, complemented by an Annex specifically addressing the “Concept of Sustainable Urban Mobility Plans”¹³, alongside with four Staff Working Documents on urban logistics¹⁴, urban access regulations¹⁵, deployment of Intelligent Transport System Solutions in urban areas¹⁶ and urban road safety¹⁷. Although still in discussion at the European Parliament, the stock-taking exercise on the 2011 Transport White Paper currently in discussion in the European Parliament, but also on the Sustainable Urban Mobility Report, also mention access restrictions¹⁸.

During the presentation of the Work Programme of the European Commission for 2016, the European Commissioner Violeta Bulc mentioned that the EC could include access restriction in the road package¹⁹ to be published early 2016.

On the operational side, the Directive on the interoperability of electronic road toll systems (Directive 2004/52/EC - Commission Decision 2009/750/EC) apply, envisaging a European Electronic Toll System, that would enable roaming and billing across tolling systems within the EU internal market. The legislation enables local and small systems (such as urban toll systems) to exempt from application.

¹² European commission June 2015 (2)

¹³ *ibid* (3)

¹⁴ *ibid* (4)

¹⁵ *ibid* (5)

¹⁶ *ibid* (6)

¹⁷ *ibid* (7)

¹⁸ Point 24 of the Sustainable Urban Mobility Report; amendments 122 & 135 of the Midterm Review

¹⁹ European parliament, June 2015(1)

Recommendations

Provide guidelines

- European institutions should provide guidelines for future implementation of pricing measures.
- There is also a need for guidelines on standardisation of pricing measures.

Support the creation of networks

- European institutions should help the development and deployment of pricing measures through support of intercity cooperation.
- European institutions should ease dissemination and experience exchange on local, as well as on national, level by supporting the creation of networks to spread the concept of fair and efficient pricing measures.
- States and other actors should work to create conditions for cities' officials to learn more about pricing measures through workshop seminars on regular basis.

Provide funds

- The EU should provide development funds from which pilot projects involving pricing measures can apply for founding. (learning from the United States as an example)

Create a secure environment for the consumer

- The European level should create a framework to protect the confidentiality and privacy of users when road pricing is considered.
- State authorities should monitor how cities are handling regulations and prevent citizens from being overcharged.

Think of pricing measures as a package

- Local actors must be encouraged to, and supported in, finding methods where infrastructure provision and pricing measures are evaluated at the same stage in the decision-making process of transport regulating investment.
- It is quite possible to combine different types of pricing measures. In fact, a package can be the very best use of road and parking pricing measures. It is important that policy makers do not see them as isolated choices.

Ease cooperative procurement

- The deployment of pricing measures would be gained if cities were

allowed to cooperate, and helped doing so, in the procurement of technical equipment.

4.2 Non-motorised transport

Appointed innovative measures are:

- *Bicycle parking schemes*
- *Creating people friendly streets and public spaces*
- *Fast cycling lanes*

The measures' role in a vision of future urban transport

Bicycle parking schemes and fast cycling lanes improves the infrastructure for cycling which increase the use of sustainable modes of transportation. Creating user-friendly streets and user-oriented public spaces improves the conditions for all non-motorised transport as well as the citizens' quality of life. More cycling and walking could bring a decline in CO_x, NO_x and PM_x emissions and noise reduction, hence providing a better public health.

Drivers

The public is increasingly into cycling. In many cities, cycling is seen as trendy and fashionable while cars are seen as old-fashioned. The number of cycling trips is also increasing in many cities even without institutional support. There is a bottom-up push in many cities for better walking and cycling facilities led by citizens and citizens' associations. Experience e.g from Donostia show that as soon as you build appropriate cycling and walking infrastructure, it fills up and used on a regular basis.

Favouring policies, like safety policies in cities, are drivers for cycling and cycling measures. Safety policies can be the introduction of speed reduction which works in favour of cycling by increasing safety and reducing injuries and fatalities. In some cities and regions, some political leaders are now working in favour of cycling and friendly streets and public places.

Practical advantages of cycling makes it a good choice for personal transport. As congestion increases, cycling becomes more popular since they easily pass cars waiting in line. This shortens the travel time and makes bike a reliable mode of transportation.

Environmental and health effects speak in favour of the bike. The health aspect of active transportation is important, especially for older people. Walking or cycling instead of using a car reduces emissions, noise and congestion. Good conditions for cycling and walking increase the chance to get a good ranking in "Quality of life" of liveable cities. This might encourage policymakers to invest in

these measures.

Barriers

The experts' view on the barriers of implementation of non-motorised transport remains more or less unchanged between 2013 and 2015. Both years, the barriers are characterised by a lack of resources, such as funds, political will and physical space.

In 2013, the identified barriers were categorised as: 'lack of space' (28), 'insufficient funds' (23), 'political problems/reasons' (17), 'strong lobby groups' (11), 'lack of knowledge' (8), 'lack of interest' (5).²⁰

The most striking change that has occurred between 2013 and 2015 is the emerging focus on standard practices in transport planning as barrier to the deployment of non-motorised transport.

The following paragraphs summons the barriers identified by experts 2015:

Walking and cycling are not taken seriously enough as modes of transportation. For cycling this is true for all European countries except for the Netherlands, Denmark and to some extent in Germany. Cycling trips have not been properly accounted for, hence a lack of comparable data, both over time and across borders. This is one reason why no major investments for cycling is made. When it comes to walking as a mode of transport, even less information is available then for cycling.

Standard practices in transport planning can also form a barrier if cycling lanes are not well modelled and insufficiently represented. With walking it is even worse. Furthermore, there is no standard approach on how to measure modal share for these modes of transportation. Walking and cycling are "invisible" modes that are often misrepresented in data collection.

Hard working & lack of interest groups, is a great barrier in the promotion of walking and cycling measures. Although most people walk as part of their daily transport, there are very few groups that advocate for proper walking facilities. For cycling, advocating groups do exist but with limited communication and marketing budgets in comparison with the car industry. Shop keepers often oppose the removal of car parking spaces, thinking they will lose customers. This is a problem in the work of freeing space for walking and biking.

Lack of policies and funds are direct barriers for the implementation and deployment of these kind of measures. Today, there is little political will to allocate space to non-motorised modes.

The infrastructural catch 22 represents a big dilemma for cycling measures. If you don't build infrastructure you won't get people cycling and many cities refuse to build infrastructure because they don't have a specific budget for major cycling

²⁰ Number in parenthesis indicates number of times each barrier was mentioned by the experts in connection to any of the identified measures 2013

infrastructure measures and so far, the European Union have not tended finance them either.

EU Policy Relevance

Measures with relation to cycling refer directly to APUM Action 3 — Transport for healthy urban environments. The TWP also states that facilitating walking and cycling should become an integral part of urban mobility and infrastructure design. In addition the TWP states that ‘facilitating walking and cycling should become an integral part of urban mobility and infrastructure design’, this measure also relates to road safety objectives set within the EU.

The TWP envisages to “by 2050, move close to zero fatalities in road transport. In line with this goal, the EU aims at halving road casualties by 2020 and make sure that the EU is a world leader in safety and security of transport in all modes of transport.” The TWP’s Action 16 - towards a ‘zero-vision’ on road safety - in that regard commits to “pay particular attention to vulnerable users such as pedestrians, cyclists and motorcyclists, including through safer infrastructure and vehicle technologies.” As previously mentioned, the Transport White Paper is currently under review, with an additional target proposed by the Parliament to reduce by 35% the number of people seriously injured by 2020²¹.

The COM(2010)389 - Towards a European road safety area: policy orientations on road safety 2011-2020 envisages to promote the application of the relevant principles on infrastructure safety management to secondary roads of Member States, in particular through the exchange of best practices. The document makes specific mention of cyclists and pedestrians, stating that ‘since the problem is mainly related to urban management, most of the actions will have to be carried out at local level, in accordance with the Commission’s Action Plan on Urban Mobility. Given the significant environmental, climate, congestion and public health benefits of cycling, it merits reflection whether more could not be done in this area.’ This was followed up in June 2015 by an interim evaluation of the road safety policy framework²², including a staff working document on road safety²³. In 2010, the initial overarching objective was to halve the number of road deaths over the decade, with 2010 as a baseline. Member States were invited to act at the national level with no EU binding obligation. The European Commission is now expected to move forward on this topic under the road safety package to be published in 2016 by the European Commission. This will take the form, amongst others, of a revision of the General Safety Regulation (661/2009)²⁴ and the Pedestrian Protection Regulation (78/2009)²⁵.

²¹ Paragraph 14 a) of the Report of the Parliament’s rapporteur. Several amendments to this report are calling for a 40% goal and the inclusion of a vision for zero casualties in traffic

²² European commission, June 2015 (8)

²³ *ibid* (9)

²⁴ EUR-Lex.europa.net, June 2015 (1)

²⁵ *ibid* (2)

With regards to fast cycle lanes, the police references mentioned above under measure 2.1 and 2.2 apply. In the framework of the current discussion about the EU's Multi-annual Financial Framework, the European Parliament's Tourism and Transport Committee has voted recently on crucial guidelines for EU transport infrastructure. The EP have decided to include cycling within the Trans-European Transport Network ('TEN-T') guidelines. This could enable further deployment on longer distance cycling corridors, and infrastructures such as fast cycle lanes. However, the European Commission has not yet decided upon actions in this regards.

Finally, within the aforementioned Sustainable Urban Mobility Report currently in revision at the European Parliament, a target is currently set to double the cycling rates in urban areas by 2025²⁶²⁷.

Recommendations

Provide guidelines and platforms

- Establish recommended targets for modal splits and targets for budget allocations for cycling and walking.
- The European Commission should make the Urban Mobility Scoreboard, including cycling and walking, mandatory for all cities.
- Continue the development and use of the Urban Mobility Scoreboard to benchmark the progress of urban areas across Europe.

Spread information

- There is a need for country (and language) specific dissemination of best practice. Broad dissemination in English across Europe is not efficient enough.
- The European Union can take on the role to communicate on the benefits of active mobility to meet the resources of car advertising.

Provide funds

- Include cycling and walking in structural/cohesion funds.
- Include the implementation of cycling and walking improvements as a funding conditional (this could also be as part of SUMP's).
- Clear allocation of budgets at the national level to non-motorised transport.

Prioritise cycling

- Appoint a European coordinator for cycling.

²⁶European Parliament Draft report 2014/2242, Point 9

²⁷ This should not be taken for granted and applicable in the near future: at the time of the finalisation of this report, this paragraph received several amendments calling for its deletion.

4.3 Advance network and traffic management to support traveller information

Appointed innovative measures are:

- Open-access server for applications-based traveller information
- User friendly human machine interface (HMI) for traveller information

The measures' role in a vision of future urban transport

Advance network and traffic management to support traveller information has an important role in the creation of an optimum urban mobility in the future. A long term vision is that traffic data can be collected from a range of sensors (traffic signal controller, CCTV, parking, Bluetooth devices and mobile phones) to enable near personalised traveller information. This would include data from public authorities in charge of transport infrastructures (e.g. traffic signals, CCTV, etc.) as well as private companies which provide traffic information services.

Such a vast amount of data would include many different modes of transportation – including walking and cycling which are not normally covered by transport authority's data. The whole network could then be optimised with all modes of transportation taken into account. Such a big data could allow optimum personal travel solutions by matching demand with the optimum supply. For example, if a person is looking for a taxi ride, the system could be able to alert taxis in the nearby area to pick the person up. This will reduce the waiting time of the passenger as well as wasted mileage of the taxi in looking for passengers.

Drivers

Increasing environmental awareness and the general awareness of the negative impacts of transport – such as emissions, noise, occupied road space and congestion – is encouraging the automatic collection of traveller's data that is made open and available to support sustainable travel measures.

Increased interest in big data in the private sphere is manifested by Google and TomTom, two giant companies who both collect data for their traveller information services. The main driving forces for private companies is, most often, the prospect of making profit by selling the information itself or the product that uses such traveller information. For example, TomTom collects data to provide better real time information of traffic congestion and travel time to its subscribers.

New methods of data collection are evolving. The concept of the 'Internet of Things' (IoT) is facilitating the data collection from various sensors. There are

also other alternative ways of collecting personalised data without having to buy them from private parties. Competition and challenges allows authorities to get consent to collect data from users in the network.

Ongoing move towards openness is now taking place on a global scale. The open government is another driver in opening up traffic data.

Barriers

The experts' view on the barriers of implementation of advance network and traffic management to support traveller information has changed since 2013 when the measures were first identified in TIDE. However, it is to be noted that the current discussion was focussed on the open data to provide apps based traveller information only as advanced bus priority measure was not taken forward in TIDE. Hence barriers such as 'conflict with overall traffic flow' and 'political & co-ordination' were mostly related to this measure did not feature in 2015 discussion.

In 2013, the identified barriers were 'insufficient funds' (15), 'political & co-ordination problems' (9), 'conflict with overall traffic flow'(7), 'lack of knowledge/know-how'/competence' (6), 'lack of co-operation & co-ordination (6)', 'technological problems/difficulties' (4), 'issues on data ownership & rights'(3) and 'societal acceptance'(1).²⁸

In 2015 the experts seem to focus more on issues such as data access, data security, legislation and standards than on funds. Furthermore, while technical knowledge-gaps were identified as a barrier in 2013, the only knowledge-gap mentioned as a barrier in 2015 is of an economical character.

The following paragraphs summarises the barriers identified by experts in 2015 (in relation to the first and second measures within this cluster):

Difficulties in accessing corporately owned data represents a barrier to the deployment of advance network and traffic management to support traveller information. The current legislation on data only covers data collected by public authorities and not by private parties. Hence the private parties are not compelled to make their data available to everyone. Unless compelled by the law, private parties may not be interested in sharing their data if it isn't in their commercial interest.

Privacy and data security concerns in the management of personal data is another barrier for collecting data from smartphones and other personal devices.

Lack of format standards, in terms of the lack of both national and European data format standards, communication protocol and architecture, is proving to be

²⁸ Number in parenthesis indicates number of times each barrier was mentioned by the experts in connection to any of the identified measures 2013

a barrier for the growth of open data systems. Standardisation would enable more usage of the data by different companies.

Known cost and uncertain benefits makes authorities reluctant to move forward. If authorities needed to buy data from private companies to improve urban mobility and then provide freely to the market, the cost would be a deterrent. The current lack of knowledge about the economic benefits of open data is therefore considered as a barrier. Without proper economic justification, public authorities will keep finding it difficult to make investments.

EU Policy Relevance

The TWP envisages to create the framework conditions to promote the development and use of intelligent systems for interoperable and multimodal scheduling, information, online reservation systems and smart ticketing. This could include a legislative proposal to ensure access of private service providers to travel and real time traffic information (action 24) The specific objective is to promote awareness of the availability of alternatives to individual conventional transport (drive less, walk and cycle, car sharing, park & drive, intelligent ticketing etc.) (action 27). The EC commits to specifically look into the 'next generation of multimodal traffic management and information systems (Action 25).

The APUM refers in its Action 20 — Intelligent transport systems (ITS) for urban mobility mainly to the ITS Action Plan. This Action Plan was accompanied with a European Directive ²⁹ providing the legal framework to accelerate the establishment of interoperable and seamless ITS services in the field of road transport and its interfaces with other transport modes. The Action Plan for the Deployment of Intelligent Transport Systems in Europe (COM(2008) 886) aims to accelerate and coordinate the deployment of Intelligent Transport Systems (ITS) in road transport, including interfaces with other transport modes. Both the ITS Action Plan's Action Area's 1 - Optimal use of road, traffic and travel data and Action Area 2 - Continuity of traffic and freight management ITS services on European transport corridors and in conurbations as well as Action Area 5 - Data security and protection, and liability issues relate to this measure. The ITS Action Plan's Action Area 4 - Integration of the vehicle into the transport infrastructure is the most applicable to this TIDE measures, however this area relates more to the technical standardization of communication protocols than to the actual operational management of vehicles in a traffic environment.

As a part of the implementation of the aforementioned Action Plans, the Commission established in December 2010 an Expert Group on Urban ITS³⁰ composed of practitioners, representatives for local and regional authorities and their main partners i.e. transport operators, service providers, industry, research and standardisation bodies. Such balanced composition of the Expert Group

²⁹ Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport, OJ L 207, 6.8.2010, p. 1.

³⁰European commission June 2015 (8)

helped to bring to the fore-front of discussion the local experts in the domain of ITS and other stakeholders with crucial understanding of urban situations, problems and challenges. During its two-year mandate the Expert Group supported by the Commission, developed a set of Guidelines for the deployment of key ITS applications in urban areas , the executive summary of which is annexed to the staff working document on Sustainable Urban Mobility package. It also collected related best practices and made recommendations for further standardisation in the domain of urban ITS.

As regards with the standardisation at a global scale, the draft RTTI specifications³¹ were published in December 2014. Their formal adoption is imminent. The specifications require road authorities to publish road and traffic data in a standardized format (eg, DATEX II), in a timely manner and via a national access point. The specifications apply to the TEN-T roads plus other motorways. However, it is foreseen to be extending to urban areas and has therefore introduced the 'Priority Zone' notion into the RTTI specifications. But such Priority Zones are not mandatory and are a Member State prerogative, and have not yet been implemented at local or regional level.

Recommendations

Provide policies and standards

- Actors on a European level should set out a policy framework to facilitate more data sharing with protection of personal data – taking into account data ownership/protocol/specifications/data format.
- Develop standards for data format, communication protocol, specifications and global standardisation to improve interoperability and increase the use by various different parties from different places/countries. This allows cross-boundary applications to be developed and increases usage. However, care should be taken to avoid expensive systems having to be implemented in the name of standard.
- Develop best practice guidelines, ideally including a Business Case for implementation.

Support the creation of networks

- The creation of an environment for data sharing amongst all the stakeholders (public authorities, private companies and the road users) could pave the way for Advance network and traffic management to support traveller information.
- The European Commission (EC) could help to develop global

³¹ ibid (9)

standards for data format. By inviting different countries to network the EC could make sure that the standards are developed with all the different perspectives taken into account from the beginning.

Finance large scale trials

- Large scale field trials demonstrate the practicality of field implementation and convince/encourage other cities to take up the measure.

4.4 Electric mobility

Appointed innovative measures are:

- *Clean city logistics*
- *Financing schemes of charging stations*
- *Inductive charging for public transport*

The measures' role in a vision of future urban transport

The installation of charging infrastructure is a necessary condition for the market diffusion of electric vehicles. It is a vital component in striving to achieve an urban transport system that offers “electrified multimodal mobility for both personal and freight traffic”. Clean city logistics and electrified personal and public transport options are all part of such a vision. The benefit of an electrified transport system is that it improves the air quality, reduces emissions and noise pollution.

The main challenge for the installation of (semi) public charging stations is the establishment of sustainable business and financing models, since the revenue on the electric power does usually not cover the cost for installation. Innovative approaches for financing schemes include combinations of parking and charging fees through the integration of charging into on-street and off-street parking management, the generation of additional revenue by advertisement or sponsoring, significantly increased prices for electric power at public charging stations and for special services like fast charging, or public-private partnerships.

Drivers

Increased environmental awareness, both on a local and a global scale, and the positive effects it has on the quality of life, are drivers for deployment of electrical mobility. On a local scale, the air quality and level of noise pollution are important indicators for a liveable city. Electrical vehicles contribute to far less air and noise pollution which improves the life quality in urban areas. On a global

scale, emission of CO₂ GHG is a well-known problem that increasingly draws public and policy makers' attention. Electric vehicles using renewable energy can support CO₂ emissions reduction.

Policy instruments for technological development can be a driver for the deployment of electrical mobility measures. One example of an existing policy for sustainable technological development is the EU proposed individual CO₂ targets for every original equipment manufacturer (OEM) based on the average mass of the vehicle fleet. The European Commission has also installed a system of "supercredits", which aims at encouraging supply of battery-electric and plug-in hybrid cars and will continue beyond 2020. In general, member states and supranational organisations are increasingly trying to direct the technological development toward a more sustainable direction. This generally favours CO₂ efficient technologies such as electrification of transport.

Technological advancements have been strong in the recent years. Particularly in the field of battery technology, where the energy density, the weight and the cost of the battery, all have been improved at the same time.

Barriers

In 2013 the barriers of implementation and deployment of electric mobility measures were specified on a very general level with a strong focus on the lack of sufficient funds. The identified barriers were: 'insufficient funds' (24), 'political problems' (9), 'technical problems/difficulties' (7), 'lack of knowledge' (7) and 'lack of social acceptance' (4).³²

The categorisation of the barriers in 2015 is somewhat more specific. Here, the barriers describe physical pre-conditions, political/planer mind-sets and bureaucracy. Unlike in 2013, technical problems are hardly mentioned in 2015. The following paragraphs sums up the barriers identified by experts 2015:

The "battle for public space" has caused parking space to become an increasingly scarce resource in cities. Parking space for EVs is in direct competition with parking space for conventional vehicles.

Infrastructure for electric vehicles is often dissatisfactory or totally missing. Absence of a comprehensive public charging infrastructure, in combination with concerns about the driving range, is the main barrier in the public perception of electric vehicles.

High purchasing costs of Electric Vehicles in comparison to conventional vehicles is a barrier.

Policymakers think "vehicle" and not "mobility". There is a tendency

³² Number in parenthesis indicates number of times each barrier was mentioned by the experts in connection to any of the identified measures 2013

amongst policy makers and planners to set their minds on “electric vehicles” instead of focusing on “electric mobility” in general or even on “sustainable mobility”. Electric mobility includes transport modes such as rail and public transport and sustainable mobility is an even wider concept. A widening of perspectives could change the conversation to an issue of a system change, rather than a one to one substitution of cars. Moreover - Electric car-sharing is often forgotten as a mode of transport in the public transport sector.

Standardisation causing bureaucracy can constitute a barrier for innovations. Standardisation allows a more cost efficient production, but on the down side it creates bureaucracy and therefore barriers. One example of a promoting standard of the EC is the plug Type 2, which is mandatory in the EU from 2017.

EU Policy Relevance

The TWP's Action 33 - A strategy for near- 'zero-emission urban logistics' 2030 sets to Define a strategy for moving towards 'zero-emission urban logistics', bringing together aspects of land planning, rail and river access, business practices and information, charging and vehicle technology standards. This links in to the TWP's overall objective to halve the use of 'conventionally-fuelled' cars in urban transport by 2030; phase them out in cities by 2050 and to achieve essentially CO2-free city logistics in major urban centres by 2030. The TWP also states the EC will act upon rules on the interoperability of charging infrastructure for clean vehicles including guidelines and standards for refueling infrastructures. This also was translated into the Sustainable Urban Mobility Package, more specifically in the staff working document on urban logistic³³

As regards with charging infrastructure, the EU policy does not elaborate the business models for this particular issue, but includes statements with regards to involving private sector in financing transport projects.

The APUM in its 'Strengthening Funding' section explains that 'investment is often needed in infrastructure, vehicles, new technologies, improved services, etc.. Most of the expense is covered by local, regional or national sources. The growing needs for funding complex transport systems and the likely decrease in the availability of public financing are the main challenges for the future. The use of EU funding, including European Investment Bank instruments, can provide significant incentives and help leverage private funds. In the short term, the Commission can help authorities and stakeholders to explore existing funding opportunities and develop innovative public-private partnership'.

The TWP Action 38 - Private sector engagement includes the commitment to encourage MS to use more PPPs, while acknowledging that not all projects are suitable for this mechanism and to participate in designing new financing instruments for the transport sector.

³³ European commission June 2015 (10)

On 24 January 2013, the European Commission launched a clean fuel strategy for Europe³⁴. The main aims of the package of measures are to ensure common standards in the EU member states and overcome barriers to the use of clean vehicles and alternative fuels. A proposal for a “Directive on the deployment of alternative fuels infrastructure” aimed at ensuring the build-up of alternative fuel infrastructure and the implementation of common technical specifications for this infrastructure in the Union. Its objective is to facilitate the work of market forces and contribute with this initiative to economic growth in Europe.

The main measures proposed in the so-called Clean Power for Transport Package, of relevance to urban transport, concern recharging points for electric vehicles, the development of a Hydrogen network and refuelling with Liquefied (LNG) and Compressed (CNG) Natural Gas. The first measure is relevant within the context of TIDE’s activities on electromobility.

The situation for electric charging points varies greatly across the EU. The leading countries are Germany, France, the Netherlands, Spain and the UK. Under the proposal, a minimum number of recharging points will be required by each Member State by 2020, 10% of which should be publicly accessible. This number is based on the number of electric vehicles planned in each of the Member States. The aim is to put in place a critical mass of charging points so that companies will mass produce the cars at reasonable prices. The number of publicly accessible recharging points is 10% of the total number of recharging points.

A common EU wide plug is also an essential element for the roll out of electric vehicles. Currently, there are two main different types of charging points in Europe. This could lead to a situation where a car that travels from France to Germany cannot be refuelled. The EC proposes to have common standards for electric charging points across Europe designed and implemented by December 2015 to ensure that electric cars can circulate freely across the EU. To end uncertainty in the market, the Commission has announced the use of the “Type 2” plug as the common standard for the whole of Europe. According to the Commission, Member States will be able to implement these changes without necessarily involving public spending if they use the wide range of measures available to mobilise private investment. At the same time, EU support is already available from TEN-T funds, cohesion and structural funds. This was translated in the adoption of the Annex 2 of the aforementioned directive adopted in October 2014³⁵.

For ‘Inductive charging for public transport’, the main policy reference is the European Roadmap for Electrification of Road Transport³⁶ (currently 2nd Edition) published by the technology platforms EPOSS, ERTRAC and SMARTGRIDS.

³⁴ European union, June 2015 (1 and 2) and European commission June 2015 (11)

³⁵ EUR-Lex.europa.net June 2015 (3)

³⁶ European Green Vehicles Initiative, June

This makes reference to inductive charging as well as BEVs for public transport.

Recommendations

Use policy instruments to influence development

- Fuel quality regulation should be a significant policy element in the reduction of greenhouse gas emissions. The EU Legislation requires a reduction of greenhouse gas intensity of the fuels used in vehicles by 6 % in 2020. This can be achieved inter alia thorough the use of electricity.
- It is important to link the energy and transport policies to ensure that the GHG intensity of electricity used in vehicles is lower than emissions from conventional fuels.
- Enhance the obligations of Original equipment manufacturers (OEMs) by compelling them to work on “smarter vehicles” as well as on the average emission.

Work on standardisation and interoperability

- Further work on standardisation and interoperability has to be done on an European level

4.5 Public transport organisation

Appointed innovative measures are:

- *Creation of public transport management bodies for metropolitan areas*
- *Contracting of services focused on improving passenger satisfaction and efficiency*
- *Marketing research as optimisation tool in public transport*

The measures' role in a vision of future urban transport

Creation of public transport management bodies for metropolitan areas can be a very positive instrument to strengthen both the integration and competition within transport systems in order to provide maximum value for money and to balance spatial and environmental issues, since it combines responsibilities with possibility to decide and act.

Today, the income of an operator is either fixed, only slightly dependent from passenger satisfaction (gross-cost model) or tied to the amount of paying passengers (net cost-model). It has proven to be a problem since the amount of passengers depends more on external factors, such as economic growth, spatial

structure and employment rate, than by factors the operator can influence. As a means to motivate operators to deliver optimal level of quality, cities are now introducing contracting of services focused on improving passenger satisfaction and efficiency. This is a new generation of contracts, so called 'gross-cost contracts with incentives' with the potential to improve public transport from the travellers point of view and hence to increase the modal share.

Marketing research as optimisation tool in public transport is a mean to build a more efficient and appreciated public transport system which in turn will increase the market-share for public transport and lower emissions, etc. Marketing research is widely used in the business sector with good results. In public transport, market research could be used for evaluation and improvement of the transport system and services, as well as to predict future transport behaviour. It also provides valuable input data for transport modelling (esp. qualitative data on transport behaviour and preferences) and could be used together with sophisticated ITS solutions as well for Sustainable Urban Mobility Plans, which have become common practice in some member states.

Drivers

Increased use of smartphones is a driver since it alters new ways to collect user information as it can give costumers axes to personalised communication with the organisation of public transport and vice versa.

Stakeholder acceptance of reorganisation, in terms of social and political acceptance for new organization of Public Transport management, is important to bring the measures forth.

Increased acceptance for the "user perspective" and the importance of user driven perspective in development of public transport is an important driver. A context in which user satisfaction is the primary goal, rather than economic efficiency, is a good driver for these innovative measures.

Coherent policies on all levels i.e. consensus between regional and national political actors on goals, responsibilities and the current state of public transport, is a good driver for local take-up and deployment of these measures.

Barriers

The barriers of implementation and deployment of public transport organisation measures are identified on a more specific level in 2015 than in 2013 which makes comparison somewhat difficult.

In 2013, the identified barriers were categorised as: 'political reasons/problems' (28), 'insufficient funds' (12), 'lack of interest' (10), 'conflict/lack of co-operation

between private and public sector (10), 'lack of knowledge' (4).³⁷

In 2015, the experts still identify barriers of a political nature, as well as conflicting interests between the private and public sector. On a general level, the focus seem to have shifted somewhat over the two years from identifying barriers on the theme of general policy and funds, to a focus on more specific issues such as flexibility, data access and legislation.

The following paragraphs summons the barriers identified by experts 2015:

Lack of flexibility in governance structure, perhaps consisting of a will to long-term finance, political will to strong control or natural monopolies can slow the process of reorganising the management of public transport. This barrier might be strengthened in metropolitan areas without relevant management structures/schemes.

Privacy and data security legislation are important factors influencing the possibility to implement and deploy the use of marketing research as a base for public transport planning and design. This, in turn, would affect the efficiency of contracting of services focused on improving passenger satisfaction and in part also the creation of public transport management bodies for metropolitan areas

Different legal and financial contexts on different levels of governance are an unfortunate condition in the creation of public transport management bodies for metropolitan areas.

Political timing matters. If the contracting of services focused on improving passenger satisfaction is implemented close in time to an election of other political event, it can lead to administrative and political resistance.

Transparency of business intelligence is important. Today there is general reluctance of private operators to share data. Sharing should be an obligatory requirement when signing a contract.

EU Policy Relevance

EU policy background for this measure can be found in three policy areas:

- The Regulation (EC) No 1370/2007 on public passenger transport services by rail and by road requires from competent authorities a formal decision about the method of operations (in house or outsourced) and transparency in tendering and financing. This has created leverage across Europe to reform local public transport operations, including the institutional setting of PT management.

³⁷ Number in parenthesis indicates number of times each barrier was mentioned by the experts in connection to any of the identified measures 2013

- The two Directives on public procurement³⁸ which specifically address public passenger services for contract services for bus and tramway.
- The European system of national and regional accounts, abbreviated as ESA95 or sometimes 1995 ESA has caused the establishment of arm's length agencies. The ESA95 collects comparable, up-to-date and reliable information on the structure and developments of the economy of the Member States of the European Union and their respective regions. By providing an internationally compatible accounting framework, ESA95 makes it possible to describe the total economy of a region, country or group of countries, its components and its relation to other total economies. It determines a.o. which numbers are taken up in the consolidated debt of public authorities.

As the distinction being thin between the two legislative backgrounds, the European Commission therefore provided in March 2014 with guidelines to further detail what public transport services falls under what kind of EU regulation³⁹. As regards with the Regulation 1370/2007⁴⁰ is still under review by the European Parliament and the Council and is likely to change quite substantially the state of play in terms of in-house provision and direct award/tendering procedures. This could directly impact local/regional management contracts with specific requirement with regards to user satisfaction and marketing research.

³⁸ DIRECTIVE 2014/24/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on public procurement and repealing

³⁹ EUR-Lex.europa.net, June 2015 (4)

⁴⁰ EUR-Lex.europa.net, June 2015 (5)

Recommendations

Provide standards and guidelines

- There is a need for a common, standardised set of indicators for monitoring of contracts. The EU can support deployment by improved monitoring of fulfilling the Public Service Obligation (EC Regulation 1370/2007).
- European guidelines on transparency in terms of users' satisfaction data and clear and accessible tendering conditions would be very welcomed to local actors.

Spread information

- There is a need to collect and spread information on best practices on contracting among European cities, presented together with their economic results, including a long-term approach.
- There is a need to disseminate research results at decision-makers level. Higher level policy makers can facilitate for more local actors by providing relevant research results.

Support local cooperation

- In the creation of public transport management bodies for metropolitan areas, there is a need for policymakers on a higher level to support municipal cooperation as well as intra-municipal cooperation and investigate if synergies can be created by connecting public transport interest to other municipal sectors such as transport, waste, water, etc.

Provide funds

- The EU need to keep supporting the implementation and deployment of these measures through programs like Horizon 2020.

4.6 Summary and correlations

Summary

Each cluster has identified three to five drivers and four to five barriers of deployment. Table 1 summarises the drivers and barriers of deployment of all five TIDE clusters.

Table 1 – Summary of drivers and barriers of deployment

New pricing measures	Non-motorised transport	Advance network and traffic management...	Electric mobility	Public transport organisation
Drivers				
<ul style="list-style-type: none"> • Increased congestion • City shortage of funds • A new paradigm in land use • Transport is increasingly seen as “a good” 	<ul style="list-style-type: none"> • The public is increasingly into cycling • Favouring policies • Changed economic circumstances • Practical advantages of cycling • Environmental and health effects 	<ul style="list-style-type: none"> • Increasing environmental awareness • Increased interest in big data in the private sphere • New methods of data collection • Ongoing move towards openness 	<ul style="list-style-type: none"> • Increased environmental awareness • Policy instruments for technological development • Technological advancements 	<ul style="list-style-type: none"> • Increased use of smartphones • Increased acceptance for the “user perspective” • Stakeholder acceptance of reorganisation • Coherent policies on all levels
Barriers				
<ul style="list-style-type: none"> • System inherit barriers (such as complexity, “winners and losers”, and, for road charging, slow return of investment) • Public opinion • Political will • Local circumstances (such as legal and geographical conditions) 	<ul style="list-style-type: none"> • Walking and cycling are not taken seriously (by politicians and transport planners) • Standard practises in transport planning • Hard working Interest groups, (for cars) and lack of the same (for walking) • Lack of policies and funds • The infrastructural moment 22 	<ul style="list-style-type: none"> • Difficulties in accessing corporately owned data • Privacy and data security • Lack of format standards • Known cost and uncertain benefits (for public authorities makes them reluctant to invest) 	<ul style="list-style-type: none"> • The “battle for public space” • Infrastructure (lacking or incomprehensive) • High purchasing costs • Policymakers think “vehicle” and not “mobility” • Standardisation causing bureaucracy 	<ul style="list-style-type: none"> • Lack of flexibility in governance structure • Privacy and data security • Different legal and financial contexts on different levels • Political timing • Transparency of business intelligence

The recommendations can be divided into a number of categories. Most common are recommendations calling for guidelines and standards, a recommendation that is given by every single one of the clusters. A summary and categorisation of the recommendations of all clusters is presented in Table 2.

Table 2 – Summary of high level recommendations to support deployment

New pricing measures	Non-motorised transport	Advance network and traffic management...	Electric mobility	Public transport organisation
Provide standards (5):				
*Provide guidelines on implementation of road charging systems and standardisation of pricing measures	*Provide guidelines and platforms around targets for modal splits, targets for national budget allocation, Urban mobility scoreboard	*Provide a policy framework for data sharing and protection of personal data *Develop standards for data format *Develop best practice guidelines including business case	•Work on standardisation and interoperability	•Provide standards and guidelines for monitoring contracts •Collect information on best practices on contracting
Support and finance deployment (4):				
*Provide funds for pilot trials	*Appoint pilot cities that want to change a few things fundamentally	*Finance large scale trials	*Use living labs to stimulate take-up of innovation	
Use political influence (3):				
* Prioritise transport in EU policy	* Prioritise cycling and appoint a European coordinator for cycling		*Use policy instruments to steer technological development	
Communicate research and best practices (3):				
* Support local actors in how and when best to evaluate pricing measures	*Spread language specific information on good practices			* Spread information on best practices on contracting and facilitate for local actors by providing relevant research results
Review structural and other funds (3):				
*Development funds should cover pricing measures	*Include c&w in structural funds *Make c&w-improvements a funding condition *Make room in national budgets for non-motorised transport			*Provide funds for public transport organisation measures through programmes like H2020
Support cooperation (3):				
*Support the creation of networks to ease dissemination and share experiences on national and local level		*Support the creation of networks with all stakeholders to pave the way for deployment		*Support local cooperation (municipal and intra-municipal)
Create a legal framework (2):				
*Create a framework for consumer privacy *Ease cooperative procurement			*Work on standardisation and interoperability	

Correlating measures

The TIDE project is based on a division of measures into thematic clusters. The measures, however, can have multiple connections to each other, even across the thematic divides of TIDE.

Correlations between measures can be of a positive nature, such as activities resulting in or benefitting from gathering and use of open traffic- and traveller information. But there can also be a point of contact between measures that is characterised by competition. *Bicycle parking schemes* (Non-motorised transport) and *Financing schemes of charging stations* (Electric mobility) are examples of two measures between which competition can arise in terms of a battle for space for bicycle parking or electrical vehicle charging.

Table 3 gives an overview of how the TIDE measures correlate. It is a summery based on answers from three out of five clusters. Since only three out of five clusters has contributed to this exercise it is important to notice that there might very well exist additional correlations between the measures which are not captured in the table.

Table 3 – Correlations and interdependence, part 1

		Public transport organisation			Electric mobility		
		Creation of public transport mgmt. bodies for metropolitan areas	Contracting of services focused on improving passenger satisfaction and efficiency	Marketing research as optimisation tool in public transport	Clean city logistics	Financing schemes of charging stations	Inductive charging for public transport
New pricing measures	Road user charging in urban areas	<ul style="list-style-type: none"> Potential for reinforcement – shift from car to PT (P&P) Strong connection. All TIDE Measures can be managed by MPTMB 	<ul style="list-style-type: none"> Potential for reinforcement – shift from car to PT (P&P) 	<ul style="list-style-type: none"> Potential for reinforcement – shift from car to PT (P&P) Marketing research can provide information to optimise all measures. 	<ul style="list-style-type: none"> Emission based road user charging can accelerate the dev. of clean logistics 		
	Parking charge policy	<ul style="list-style-type: none"> Potential for reinforcement – shift from car to PT (P&P) Strong connection. All TIDE Measures can be managed by MPTMB 	<ul style="list-style-type: none"> Potential for reinforcement – shift from car to PT (P&P) 	<ul style="list-style-type: none"> Potential for reinforcement – shift from car to PT (P&P) Marketing research can provide information to optimise all measures. 	<ul style="list-style-type: none"> Potential to introduce free parking for clean vehicles 	<ul style="list-style-type: none"> Synergies: fee for parking – not charging 	
Non-motorised transport	Bicycle parking schemes	<ul style="list-style-type: none"> Strong connection. All TIDE Measures can be managed by MPTMB 		<ul style="list-style-type: none"> Marketing research can provide information to optimise all measures. 	<ul style="list-style-type: none"> Increased attractiveness for cargo bikes 	<ul style="list-style-type: none"> Competitiveness: space for bicycle parking or charging 	
	Creating people friendly streets and public spaces	<ul style="list-style-type: none"> Strong connection. All TIDE Measures can be managed by MPTMB 		<ul style="list-style-type: none"> Marketing research can provide information to optimise all measures. 	<ul style="list-style-type: none"> Reinforcement: more liveable street by banning heavy polluting vehicles 	<ul style="list-style-type: none"> Potential conflicts: Charging station as obstructions (competing for space e.g. urban greens) 	
	Fast cycling lanes	<ul style="list-style-type: none"> Strong connection. All TIDE Measures can be managed by MPTMB 		<ul style="list-style-type: none"> Marketing research can provide information to optimise all measures. 	<ul style="list-style-type: none"> Increased attractiveness for cargo bikes 		
Advance network and traffic management...	Open-access server for applications-based traveller information	<ul style="list-style-type: none"> Reinforcement Strong connection. All TIDE Measures can be managed by MPTMB 	<ul style="list-style-type: none"> Moderate connection, as traffic and network mgmt issues should be included in contraction 	<ul style="list-style-type: none"> Data available in open data server could be useful Marketing research can provide information to optimise all measures. 		<ul style="list-style-type: none"> Information on charging station provided via open access data 	
	User friendly human machine interface (HMI) for traveller information	<ul style="list-style-type: none"> Reinforcement Strong connection. All TIDE Measures can be managed by MPTMB 	<ul style="list-style-type: none"> Moderate connection, as traffic and network mgmt issues should be included in contraction 	<ul style="list-style-type: none"> Apps developed could gather useful information for the research 			
Electric mobility	Clean city logistics	<ul style="list-style-type: none"> Strong connection. All TIDE Measures can be managed by MPTMB 		<ul style="list-style-type: none"> Marketing research can provide information to optimise all measures. 			
	Financing schemes of charging stations	<ul style="list-style-type: none"> Strong connection. All TIDE Measures can be managed by MPTMB 		<ul style="list-style-type: none"> Marketing research can provide information to optimise all measures. 			
	Inductive charging for public transport	<ul style="list-style-type: none"> Synergies: easier management and planning of PT charging facilities Strong connection. All TIDE Measures can be managed by MPTMB 		<ul style="list-style-type: none"> Marketing research can provide information to optimise all measures. 			

Table 3 – Correlations and interdependence, part 2

		Advance network and traffic management to support traveller information		Non-motorised transport		
		Open-access server for applications-based traveller information	User friendly (HMI) for traveller information	•Bicycle parking schemes	•Creating people friendly streets and public spaces	•Fast cycling lanes
New pricing measures	Road user charging in urban areas	<ul style="list-style-type: none">Charging information could be disseminated using open data serverPotential side effect: traffic is shifted to roads free of charge	<ul style="list-style-type: none">Charging apps could be useful for road user to make informed decisionPotential for reinforcement – shift from car to PT (P&P)	<ul style="list-style-type: none">Potential for reinforcement – shift from car to NMT (P&P)	<ul style="list-style-type: none">Potential to support each other: less vehicles more public spaces available	<ul style="list-style-type: none">Potential for reinforcement – shift from car to NMT (P&P)
	Parking charge policy	<ul style="list-style-type: none">Parking charges information could be disseminated using open data serverPotential to provide information on dynamic parking prices	<ul style="list-style-type: none">Parking charges apps could be useful for road userPotential for reinforcement (P&P)	<ul style="list-style-type: none">Potential for reinforcement (P&P)	<ul style="list-style-type: none">Synergies as additional space might become available	<ul style="list-style-type: none">Potential for reinforcement – shift from car to NMT (P&P)
Non-motorised transport	Bicycle parking schemes	<ul style="list-style-type: none">Bicycle parking information could be disseminated using open data serverInformation on bicycle parking provided by open access data	<ul style="list-style-type: none">Bicycle parking apps could be useful for the users			
	Creating people friendly streets and public spaces					
	Fast cycling lanes	<ul style="list-style-type: none">Synergies: cycling route information				
Advance network and traffic management...	Open-access server for applications-based traveller information					
	User friendly human machine interface (HMI) for traveller information					
Electric mobility	Clean city logistics					
	Financing schemes of charging stations					
	Inductive charging for public transport					

Table of correlation and interdependence

Representatives of the TIDE clusters were asked to comment on what if and how the TIDE measures are interrelated and reinforce one another by commenting on links such as co-dependence, potential to inforce one another, competitiveness etc.

Three out of five clusters contributed to this exercise. Hence the links presented in the table are based on expert opinions, but they do not include all possible connections. There might very well exist additional correlations between the measures.

Acronyms:
PT= Public transport
MPTMB=metropolitan public transport management bodies
Pu&Pu= Push and pull

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Annex 1 – List of workshop participants

The recommendations and general conclusions are largely based on the discussions and conclusions of a workshop held at the TIDE Expert group meeting in Brussels in February 2015.

The focus of the workshop was to discuss the deployment of innovative measures in urban transport, i.e. how to ‘make it happen’ as well as research priorities and how to foster new knowledge. Discussions covered both content as well as aspects relating to process and organisation.

The workshop was combined plenary sessions with break-out sessions where the participants were divided into thematic groups.

	Thematic cluster
Karin Brundell-Freij, WSP	1
Karen Anderton, University of Oxford	1
Hanna Hüging, Wuppertal Institute	1 (day 1) 4 (day 2)
Joel Franklin, Royal Institute of Technology	1
Michael Forss, WSP	1
Bonnie Fenton, Rupprecht Consult	2
Bernard Gyergyay, Rupprecht Consult	2
Fermi Echarte, City of Donostia/San Sebastian	2
Benedicte Swennen, European Cyclists’ Federation	2
Melanie Leroy, Eurocities	2
Rob McDonald, Reading Borough Council	3
Lyndon George, Reading Borough Council	3
Yannik Bousse, Polis, Coordinator	3
Birendra Shrestha, University of Southampton	3
Greg Archer, Transport and Environment	4
Berthus Postma, Rotterdam City Council	4
Anthony Van de Ven, Brainport Eindhoven	4
Andrej Cacilo, Fraunhofer Institute	4
Michael Haag, Fraunhofer Institute	4
Stephanie Priou (UITP),	5
Ivo Cré, Nicolas Hauw, Polis	5
Imre Keresu, VUB	5
Dr Ernest Czermanski (University of Gdansk),	5
Dr Marcin Wolek (University of Gdansk),	5
Akos Burghardt (BKK Budapest)	5