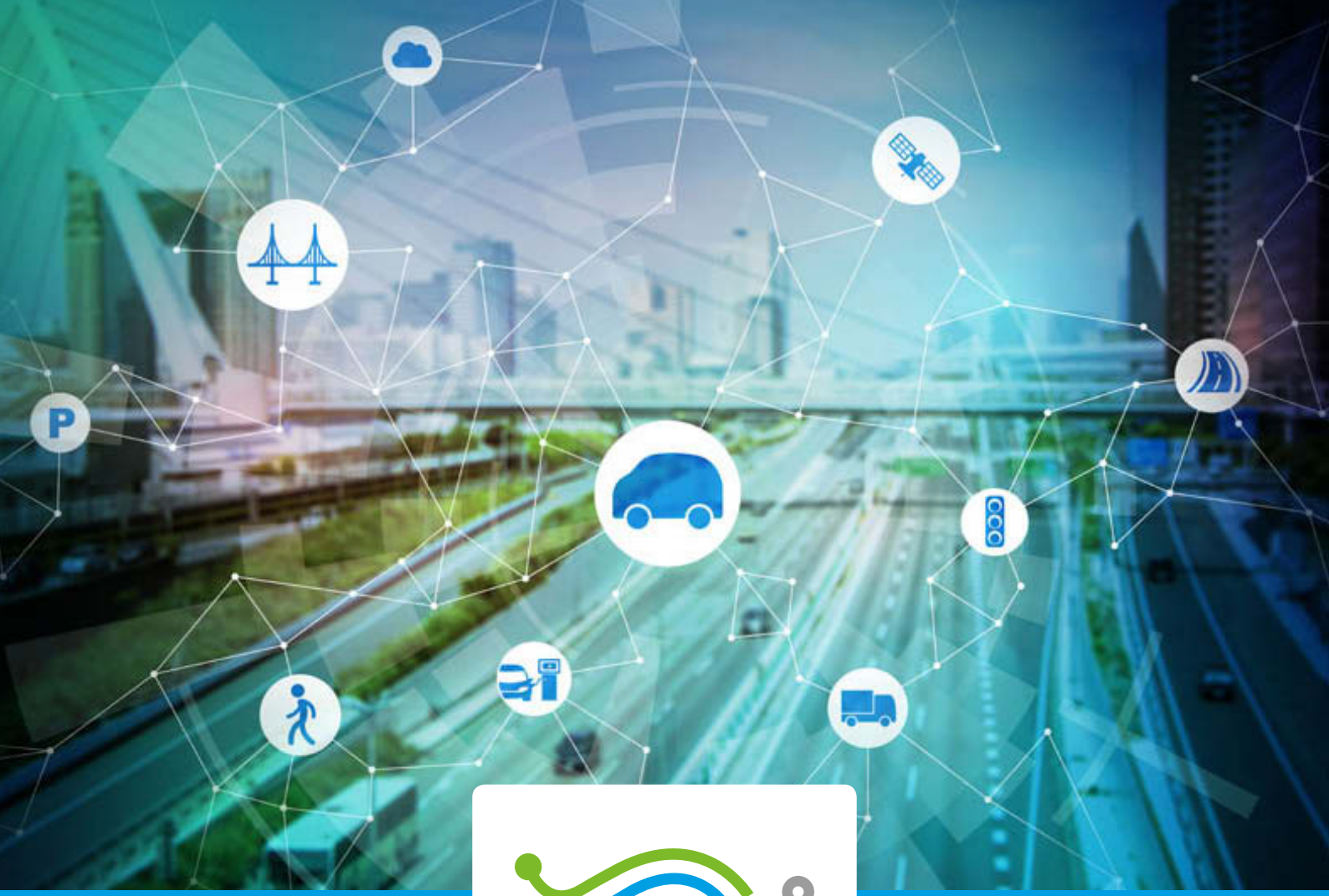

NEWBITS

Policy Recommendations

New Business Models for ITS

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NEWBITS

Foreword

The NEWBITS - New Business Models for Intelligent Transport Systems - project has been a two-and-a-half-year Horizon 2020 coordination and support action, from October 2016 until March 2019 and is part of the 'Smart, Green and Integrated Transport' Programme. The consortium consisted of 9 partners from 6 EU Member States and comprised of national ITS associations, EU-level innovation networks, ITS service providers operating worldwide, as well as research-based institutions and specialised consultancies involved in the fields of Transport and Intelligent Transport Systems (ITS), marketing research, policy analysis and innovation management.

NEWBITS analysed various ITS pilot projects currently implemented in Europe, the US and Australia to gain a better understanding of the conditions that affect the ITS innovation deployment using an improved value network-based framework that: (1) minimizes failures inherent to ITS innovation diffusion; (2) evolves current business models; and (3) identifies effective incentives to accelerate ITS deployment. To achieve this aim, the project applied a value network approach and business ecosystem concept to better understand how companies cooperate and collaborate in operational tasks in the ITS industry to create and exchange value. This allowed the NEWBITS consortium to develop a five step process for shaping and evolving business models that are described as a network with shared values and shared risks among all stakeholders.

'NEWBITS has been very successful in identifying hot spots where there is a particular problem in ITS deployment across Europe through discussions with different entities and managed to find solutions working with various stakeholders to resolve these issues.'

Blagovest Tichev
Office of Angel Dzhambazki MEP (ECR), European Parliament

The goal of this NEWBITS policy recommendations eBook is to share insights derived from four ITS case studies with regard to pathways and good practices for ITS innovation diffusion and agile business modelling with policy makers active on the EU and national level.

Why do we need new business models for ITS?

Reflecting the current status of ITS deployment across Europe reveals that many **investments** have been allocated in this market from private and public actors. All basic technology exists and is gradually being improved.

The European Commission has funded projects to investigate the **technical feasibility**, and as a result new **standards** have been developed; moreover, innovative services have also been launched on the market over the years following project **piloting**. However, in most cases there is limited evidence of their successful transferability to differing geographical and socio-economic contexts.

Therefore, despite the investments in technology development, feasibility studies and the existence of a full set of standards, the systematic market penetration of ITS applications remains indeed a major challenge.

Many ITS projects have been launched without a full evaluation of existing market conditions and customer groups, or without clearly explained business models. As a result, there seem to be multiple areas of concerns that should be thoroughly addressed in order to build a structured approach to unleash the full potential of ITS applications and enable complex innovation diffusion processes.

Firstly, when designing ITS applications, it is of utmost importance to build local **knowledge about dynamic market conditions** as determined by

current global trends and challenges, such as the demographic growth and population ageing, a significant shift away from the conventional paradigm of individual ownership towards shared use of goods and services, an increased demand for digital connectivity, and the lack of public funding to properly invest in innovative infrastructure and services. This knowledge will help identify and quantify the actual demand for such ITS applications.

Typically, the design of ITS applications has rarely focused on a full characterisation of heterogeneous user groups and hardly ever centred on their needs and expectations from such applications. This prevents meeting the specific user mobility needs and the subsequent capitalisation of tangible benefits that could result for the entire transport system. Structurally developed **needs assessments** as well as end-user engagement initiatives conducted in nearly every stage of the design process should be favoured to address needs, attitudes, behaviours and mindsets of differing user groups (such as lower income users, elderly people, disabled users, low-density area users, etc.).

Lastly, global investment in the ITS sector rarely fulfils the need for implementing a low-carbon pathway in transport as required by the growing environmental pressure dictated by climate change effects. Such pathway could be pursued by promoting **cooperation frameworks** between public and private stakeholders and by allocating the necessary financial resources for promoting sustainable transport. Synergies between policy makers, multi-lateral development banks and other financial institutions must be promoted to push the development of the ITS market towards sustainable transport. Typical measures may include setting out forward-looking transport policies, investment priorities and standards as well as favourable conditions for private-sector investments in transport.

Clear **business models** accelerating the deployment of ITS services must be designed to cover the aforementioned aspects in order to fully meet users' needs and maximise the socio-economic sustainability of European cities.

In the NEWBITS project, partners from different sectors – SMEs, multinational enterprises, associations, research institutes and innovation centres – worked together to support the development of innovative business models and effective policy incentives by providing a better understanding of the **factors affecting the deployment of ITS services**.

The insights gained and recommendations derived by NEWBITS are based on four case studies. All case studies are based on actual pilot projects and have been carefully selected and validated to cover several **transport modes** (road, rail and inland waterways) and to be representative for all ITS **market segments** (ATIS, ATMS, ATPS, APTS, CVS). In addition, different geographical areas and ITS services were captured.

The focus of these case studies were the **business ecosystems** of specific ITS services, which are informal networks of organisations linked in the process of ITS deployment, and the role of stakeholders within these ecosystems, as well as the **interactions** (projects, skilled workforce, clients, etc.) between them, complemented by a thorough assessment of the **market** (market size, demand, supply) and **user preferences** with respect to the ITS services.

CASE STUDY 1

Carpooling service in Spain – an example of the sharing economy collaborative consumption, where the platform matches users to vehicles to reduce unnecessary trips

CASE STUDY 2

Urban traffic control solution in Italy – an example of the ‚Internet of Things' smart city's C-ITS platform to monitor and forecast drivers' behaviour

CASE STUDY 3

Synchromodal container track-and trace service in the Netherlands – an example of how smart data analytics and real-time information can improve the logistic chain

CASE STUDY 4

Predictive maintenance solution for railway safety in the United Kingdom – an example of big data analytics and visualisation service of infrastructure assets to avoid unplanned repairs

Existing EU policies promoting C-ITS

In 2016, the European Commission adopted the European Strategy on Co-operative Intelligent Transport Systems (C-ITS)[1] with the main objectives to:

1. Avoid a fragmented internal market
2. Define and support common priorities
3. Use a mix of communication technologies
4. Address security and data protection issues
5. Develop the right legal framework

In pursuing these objectives, important EU R&D programmes and community initiatives such as the C-Roads Platform[2] and joint activities with industry stakeholders such as GEAR 2030[3] have been undertaken supporting the 2016 strategy.

In addition, a recent report from the European Parliament on the European strategy on Cooperative Intelligent Transport System considers the results of the ITS Platform 2016-2017 programme as highly relevant.[4] Within this framework, the results of eight working groups have recently been published by the European Commission.[5] The activities of these working groups have focused on deriving policy recommendations and various suggestions for the development and deployment of C-ITS services, including topics such as: security, data protection and privacy, compliance, ITS in urban areas, business models, road safety, digital and physical infrastructure and traffic management.

The resulting policy framework underpinning the take-up of C-ITS applications and services can be summarised as follows:

COOPERATION. Policies and initiative undertaken so far have shown that it is crucial for all industrial sectors to join forces, e.g. the telecommunication, car manufacturing, energy and transport sectors. IIn this way digital advances can be properly put in place and applied. The same importance is given to cooperation between the European institutions with the increasing participation of the EU Member States.

INVESTMENT. The involvement of EU Member States is also important to address the issue of the huge investments needed to develop an appropriate infrastructure network. This applies in particular to road networks, which are neither part of the trans-European networks nor part of a motorway network. In addition, most of the vehicles used in the EU are old and have been built with technologies that cannot keep up with the latest technological developments. Financial support from structural funds is available to finance the development of broadband networks and transport infrastructure. In addition various R&D projects are currently being undertaken under Horizon 2020. Both the European Commission and the European Parliament believe that an active role for EU Member States is crucial to bridge the digital gap between European Member States and make the most of EU funding opportunities.

DATA SECURITY. The European Commission has recently submitted a proposal on cyber-security[6] which supports the task of creating a new European certification system to ensure that digital products and services can be used safely. In the opinion of the European Parliament, this is a positive step towards ensuring secure access to data generated by moving vehicles and access to 'third-party' data, thereby supporting in such a way the deployment of C-ITS services.

SAFETY. For the deployment and take-up of automated vehicles it is vital to draw up a safety protocol which includes the human factor and gives sufficient time to 'human-machine' interaction. In this direction, the conclusion of the specialist working group dealing with security and safety in the second phase of the C-ITS platform is that every vehicle must conform to a minimum set of requirements.[7]

Position of the EU in ITS innovation diffusion

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'.[8]

A **benchmark analysis of ITS innovation diffusion** has been performed by NEWBITS comparing the market penetration status, in the EU and the US, of three specific areas of ITS innovation: sharing mobility, mobility-as-a-service (MaaS), and connected and autonomous vehicles (CAVs). Drivers and barriers as well as recommendations for improving diffusion of such ITS innovations were also formulated.

Regulatory frameworks promoting ITS innovation

A comparison between the EU and the US[9] revealed that the **regulatory frameworks** for spurring innovation are different. In particular, the multi-level governance and the level of integration is remarkably different. This implies that the possibility for the US administration to develop innovation policies for all 50 US states is generally greater than the corresponding power of the EU institutions.

Indeed, the EU budget dedicated to research and innovation (R&I) only represents a very small fraction of public expenditures in R&I in the EU. This EU 'bottom-up' strategy relies on the need to avoid a fragmented internal market due to the different national ITS markets and players.[10] This raises the need for the EU member states to define and support common priorities, in order to enable a quick deployment of ITS services by member states and local authorities, vehicle manufacturers, road operators and the ITS industry.

POLICY RECOMMENDATION 1

EU policy must reduce the innovation gap, i.e. the high fragmentation of research within the EU in order to promote ITS innovation diffusion and accelerate ITS deployment. One way to mitigate the increasing innovation gap is to strengthen the implementation of the commitments that mostly favour the weakest members of the European Union by making financial resources from structural funds available for them.

Enabling factors for ITS innovation diffusion

According to the benchmark analysis performed by NEWBITS, the critical aspects to consider in both the EU and US to boost diffusion of **sharing mobility** innovation can be found, among others, in building a critical mass for such solutions, promoting system interoperability and data sharing among proprietary platforms, establishing a community of trusted users and developing supportive transport policy measures for active mobility modes.

MaaS is at its initial stages of diffusion in the EU, whereas in the US organisational and institutional challenges have even prevented deployment. Characteristic elements driving innovation diffusion are stakeholder cooperation; the user's willingness to move from a car-borne transport; and the presence of the large majority of operators offering electronic payment, opening data and allowing third parties to sell their services.

The benchmark analysis for **CAVs** has indicated user acceptance and willingness to pay, data protection and cyber security, as well as policy and regulatory issues as the most critical factors enabling innovation diffusion. More specifically, regulatory challenges are posed by need for: a) enforcing that all new vehicles are equipped with digital connectivity and communication capabilities allowing them to interact with each other and the surrounding

road environment; b) defining open technology standards; and c) developing comprehensive national frameworks for designing and implementing CAV services.

POLICY RECOMMENDATION 2

The comparison of the ITS innovation diffusion process in the EU and US revealed the importance of the support from local authorities and the need to overcome the critical mass barrier (sharing mobility), stakeholder cooperation and the user's willingness to move from a car ownership culture (MaaS), user acceptance and the need for ad hoc regulatory actions (connected and autonomous vehicles, CAVs) as the main drivers to promote ITS innovation diffusion.

Key factors influencing successful deployment of ITS services

The deployment of ITS services is regarded to be slow and fragmented, caused by a wide range of barriers. A deeper understanding of these barriers contributes to the development of more robust business models and effective policy incentives for innovative ITS services. As the market for ITS services is very diverse, barriers and enablers may differ between market segments and stakeholders involved.

Based on a **stakeholder survey** involving experts from R&D, the IT industry, public authorities, and other organisations across different countries NEWBITS has explored (A) **key factors** influencing the successful deployment of ITS services for **five different market segments: ATIS, ATMS, APTS, ATPS, and CVS** – and (B) **the way these can be measured effectively**. The following chapter provides insights on barriers, enablers and key performance indicators (KPIs) for the deployment of ITS services.

Barriers and enablers

Barriers are any factors deterring, complicating and prohibiting the implementation or performance of ITS services. Conversely, any factor that supports the implementation or performance of these services can be identified as an enabler.

The most relevant barriers and enablers commonly encountered during the deployment of ITS services across **all market segments** include:

BARRIERS. According to the input provided by the stakeholders, economic (lack of attractive business models and lack of funding) and technical barriers (incompatible infrastructure and lack of interoperability between services) are important with respect to the deployment of ITS services. Also the lack of cooperation between stakeholders and the lack of political prioritisation are often mentioned as important barriers.

ENABLERS. According to the stakeholders, increasing political commitment, standardisation for interoperability of ITS services, more cooperation between stakeholders and attractive business models are often mentioned as relevant enablers, but also an ‚increased popularity of mobility as a service' and 'enhanced public private partnerships' are often mentioned as enablers for the various market segments.

The top 6 barriers and enablers valid for **all market segments** comprise:

✕ BARRIERS	✓ ENABLERS
Lack of cooperation between stakeholders	Increasing political commitment
Lack of attractive business models	Standardisation for interoperability of ITS services
Lack of interoperability and incompatibility	More cooperation between stakeholders
Lack of political priorisation	Attractive business models
Insufficient current infrastructure	Increased popularity of Mobility-as-a-Service
Lack of funding	Enhanced public-private partnerships

Significant differences in barriers and enablers do exist between different market segments. The results of the NEWBITS research show that the frequency by which barriers and enablers are mentioned as relevant by the respondents considerable differ **per market segment**.

BARRIERS. For example, **lack of attractive business** models is found to be an important barrier for the ATIS, APTS and CVS market segments, while **political prioritisation** is most often mentioned as an important barrier for the ATMS and ATPS segments.

ENABLERS. Increased popularity of **Mobility as a Service** is most often mentioned for the ATIS and APTS market segment, while a clear legal framework is seen as an important supporting factor for services in the CVS market.

Considering the various market segments separately, it is shown that lack of attractive business models and lack of cooperation score above average for the **ATIS** market segment, while particularly the inadequacy of the ITS infrastructure and lack of political prioritisation are relatively less important compared to other market segments.

As for the **ATMS** market segment, lack of funding and lack of political prioritisation are considered more relevant than on average, while particularly the lack of attractive business models scores below average. These findings may be explained by the public character of the services on this market segment. User acceptance also scores below average, reflecting the fact that ATMS services are usually not directly targeted on end-users.

On the other hand, user acceptance is considered to be very relevant for the **ATPS** market segment, which is probably related to the concerns on privacy and data security issues linked to services within this segment. For the same reason the inadequacies of the legal framework are considered a more important barrier for the ATPS market segment compared to other segments.

As for the **APTS** market segment, most barriers score comparable to the average scores, with the exception of lack of interoperability between ITS services which scores considerably higher – reflecting the user-driven services provided within this segment – and lack of user acceptance which scores below average.

Finally, the highly innovative character of the services within the **CVS** market segment are reflected by the fact that barriers such as 'lack of legal framework' and 'lack of demonstrated benefits' are considered relevant above average. On the other hand, lack of cooperation, lack of political prioritisation and lack of interoperability between ITS services all score below average.

POLICY RECOMMENDATION 3

Barriers and enablers for the deployment of ITS services significantly differ across market segments reflecting the differences in the nature of these market segments. Using this market segment specific knowledge on deployment barriers as input for the development of business models or policy incentives may increase the effectiveness of these activities (e.g. by differentiating policies to market segments or by developing a policy framework that provides some flexibility to deal with differences between market segments).

Key performance indicators

Key performance indicators (KPIs) are **crucial instruments** to prove the impact and benefits of the technical demonstration of an ITS service, its social acceptance as well as the sustainability of the underlying business model.

Although effective KPIs for the deployment of ITS services are available for the different market segments and service types, they are often **not defined and applied** in real-world projects. And even if they are defined, these are not always the most appropriate ones.

Major barriers hampering the application of KPIs comprise

- Lack of available/compatible data
- Lack of knowledge/skills
- Difficulties in accessing information due to data ownership
- Lack of cooperation between stakeholders
- Funding shortages

Two different **types of KPIs** are distinguished to measure the extent by which an ITS service is implemented and its overall impact, respectively: deployment and benefit KPIs.

DEPLOYMENT KPIs

Deployment KPIs are indicators to measure the extent by which an ITS service is implemented, such as the length of the transport network covered by an ITS service, the number of end-users of an ITS service, or the number of vehicles featuring ITS technology.

BENEFIT KPIs

Benefit KPIs are indicators to measure the impact of an ITS service, such as, the number of reported accidents, the average driving speed, or the number of traffic violations.

POLICY RECOMMENDATION 4

The application of two types of KPIs, deployment and benefit KPIs, is recommended to properly measure the extent by which an ITS service is implemented and its overall impact. Despite the lack of universal deployment KPIs, it is still strongly recommended to define deployment KPIs to properly monitor the implementation of ITS services.

Similarly, benefit KPIs were found to be best defined in line with the primary objective (e.g. safety, transport efficiency, environmental performance, comfort) of the service. Benefit KPIs should furthermore preferably be direct measures of the intended impacts (e.g. emissions level, number of accidents) instead of indirect measures (e.g. transport volumes).

End-user preferences

In the NEWBITS project, a conjoint analysis has been performed over four different case studies selected as representative of the ITS service landscape in four EU member states. A **conjoint analysis** is an advanced market research technique used to understand how people make decisions and what they really value in products and services.

Analysing a carpooling service implemented in a specific area (case study 1) and a traffic light assistance service (case study 2) show a certain psychological resistance in the use of these facilities. In order to break this resistance, the carpooling service must be perceived as very advantageous by offering as many benefits as possible; while for the traffic light assistance service it is important to carefully configure how the information is provided in order to increase the end-users' acceptability.

Analysing a service providing tracking and optimising of freight container transport (case study 3) and a predictive maintenance service designed for

rail transport (case study 4) revealed that the price importantly affects the use of the service. The analysis of case study 3 shows that medium and big companies are less receptive to acquire such a service unless its price is reaching a level rendering their daily operations profitable. In addition, the position of the company within the logistic chain and the different functions of within the company affect the perception and acceptance of the service as users.

POLICY RECOMMENDATION 5

To encourage mobility behaviour change, it is crucial to take into account the psychological resistance of the end-users in using certain ITS services. Consequently, conjoint analysis, market research analysis, crowdsourcing campaigns and co-creation workshops can help to understand end users' preferences and the specific characteristics to achieve higher end-user acceptability, but also to fine-tune their services to the end-users needs in terms of technical features and prices. To achieve a behaviour change, tools such as educational campaigns can be used.

An open approach: requirements for new business models for ITS

The term 'Open Innovation' refers to innovations characterised by an open and interactive value-adding process. In this respect, ITS innovation deployment also requires the involvement of multiple stakeholders and actors working together to improve the market entry of innovative ITS services. Therefore, in NEWBITS the deployment of ITS services has been studied from the perspective of a **business ecosystem**, an informal network of organisations.

As a next step, NEWBITS has initiated and promoted the operation of an **informal network of Communities of Interest** (CoIs) around pre-selected ITS services representing the four NEWBITS case studies. CoIs represent loose networks of people assembled around a topic of common interest, which mutually improve their understanding of a subject and share common passions. Their members take part in the community to exchange information, obtain answers to questions or problems. In doing so, a better understanding of the relationships between actors who work together around a core technology or service can be acquired, which is key to a deep understanding of the ITS deployment process.

Network-based approach to craft new business models for ITS

Due to the complex nature of ITS markets and technological innovations, a single stakeholder may not have all the capabilities to offer value-added services or at least, to do so autonomously in order to reach the market. Instead successful deployment of ITS innovations requires multiple stakeholders to efficiently cooperate with each other.

The NEWBITS project analysed the deployment of ITS initiatives from a **business ecosystem** viewpoint, rather than an individual organisation's perspective. This was essential to come up with sustainable business models. The business model approach employed is based on a tailored **value network analysis** (VNA), a method to explore the competitive environment identifying where and how value is created within a distinct network of stakeholders.

A value network is defined as 'the collection of upstream suppliers, downstream channels to market and ancillary providers that support a common business model within an industry'.[11] Its novelty lies in that it introduces intellectual capital and intangibles in business models. Primary activities taking place in value networks include (i) network promotion, (ii) service provision and (iii) infrastructure operation. All these activities in a value network develop simultaneously, not sequentially or cyclically, and activities are preferably reciprocal.

The analysis of the value networks of four NEWBITS case studies revealed that knowledge and intangible value exchanges are equally important to the exchange of tangible assets, products and deliverables. There is hence an increasing need to apply a value-network based approach when crafting new business model for ITS services for enhanced sustainability and profitability.

POLICY RECOMMENDATION 6

In order to enhance the sustainability of business models for ITS services, the design and creation of networks in the ITS industry needs to be facilitated, particularly taking into consideration upstream suppliers and downstream channels to the market. It is important to facilitate the cooperation among all stakeholders including end-users stimulating the creation of complementary services and supporting the core activities in a network through strategic planning, technical know-how and policy development support. Ensuring continuous political support for the ITS industry through (i) regular meetings between the industry representatives and Parliament's Transport groups and (ii) publication of explanatory materials about ITS and ITS innovation processes are regarded as important drivers.

Value creation within the network

Traditionally, the cost benefit and impact assessment analyses have been applied to policy-making evaluations. However, in terms of the networks' value creation, that is typical to the ITS industry, the quantitative VNA provides a far more extensive view as it considers the total value created in its entirety. Within such a network, stakeholders should be incentivised to cooperate, collaborate and exchange information and knowledge. Therein trust as an intangible value of the network plays a vital role. The structure and organisation of networks may not collide with competitive markets' rules.

POLICY RECOMMENDATION 7

Regulations on ITS innovation and diffusion should be based on the business ecosystem concept. Making use of the concept and the methodology of value network analysis – as an instrument to measure the created value – policy-making evaluations can be significantly enhanced.

Providing incentives to stakeholders of a value network to cooperate, collaborate and exchange information and knowledge is crucial to stimulate open innovation approaches in the ITS sector. Promoting open access to commercially designed platforms for collaboration or offered products also for educational and public purposes is another driver.

Human factor in the ITS networks

Human beings' behaviour plays an essential role in the ITS markets to drive business models to fruitful results. From the Spanish case (case study1), it is understood that the influence variables for better deployment and benefit KPIs requires new **soft skills** in the transportation sector – such as those from graduates trained in psychology or sociology. The Italian case (case study 2) proves the vitality of a **stable cooperation** between the industry and governments in order to stimulate any innovation processes with the engagement of private markets. The Dutch case (case study 3) demonstrates the importance of a **formal leader**, who plays the role of a network orchestrator and sets-up the business model framework. The British case (case study 4) shows how scientific knowledge and skilled workforce **interactions** – as value flows between stakeholders – are the foundation for new innovations in ITS, same as for any knowledge-intensive economy.

POLICY RECOMMENDATION 8

Policies are required that encourage ‚learning-by-doing' practices when implementing new ITS solutions to overcome the current behavioural inertia of end-user segments.

In particular, measures should be supported in which a critical mass of early adopters acts as a role model and thus sets multiplicative exchange processes in motion. This has to be supported by creating links between universities and the industry in order to develop sustainable business models across transport sectors.

Alternative funding sources supporting new business models

In 2018, the European Commission adopted the proposal for the regulation of the European parliament and of the council on 'European Crowdfunding Service Providers' (ECSP) for Business.[12] According the European Commission this regulation shall apply to legal persons who choose to seek authorisation and to crowdfunding service providers, in relation to the provision of crowdfunding services.

According the regulation, crowdfunding services shall only be provided by legal persons that have an effective and stable establishment in a Member State of the European Union and that have been authorised as crowdfunding service providers. Crowdfunding service providers shall act honestly, fairly and professionally in accordance with the best interests of their clients and prospective clients. They shall not pay or accept any remuneration, discount or non-monetary benefit for routing investors' orders to a particular crowdfunding offer made on their platform or to a particular crowdfunding offer provided on a third party platform.

The above mentioned regulation sets guidelines for a common EU frame-

work. **Crowdfunding** providers are no longer hindered in their ability to scale up within the Single Market due to conflicting approaches of national supervision and regulation. The EU framework proposed in FinTech Action plan offers a comprehensive European passporting regime for those market players who decide to operate as European crowdfunding service providers (ECSP).

Various schemes representing **public-private partnerships** (PPP) represent another funding source supporting new business models for ITS. NEWBITS case study 2 is an example for a successful PPP involving a municipality and local companies. PPPs are vital for any stable innovative process as risks are shared between public and private partners.

POLICY RECOMMENDATION 9

In line with the EC regulation on European Crowdfunding Service Providers for Business, reinforcing public-private partnerships, which is a very typical form of ITS application development to seize capital, can significantly foster the stability in the ITS innovation process and thereby facilitate the creation of new business models for ITS services.

Success factors for new business models for ITS

To support the effective design of new business models for ITS, NEWBITS has conducted a **cost-benefit-analysis** (CBA) of the four respective ITS business ecosystems of the case studies with the objective to gain a better understanding of the competitive environment summarising monetary and non-monetary benefits (e.g. revenues, collaboration, knowledge sharing, resource pooling, branding, citizen engagement) for different stakeholders. The CBA consists of (1) capital expenses (CAPEX), that include public funding

for the infrastructure and manufacturing costs of the mobile networks, and (2) operational expenses (OPEX), that comprise implied costs of navigation, transfer of signals and data and communication overhead for coordinating the services. Main parameters evaluated comprise: the commercialization of the ITS systems, potential revenues from such services and the investments in the infrastructure. Overall, the CBA provides an ex ante assessment of policy options on the basis of the lessons learned through the detailed analysis of the four NEWBITS case studies.

CASE STUDY 1

For case study 1 - an intelligent carpooling system for daily mobility - there is a need to reduce the number of vehicles that arrive daily on the campus of the Autonomous University of Barcelona (UAB), given that the peak of arrivals is 8,000 vehicles and there are only 7,000 parking spaces available. Reducing the number of vehicles means significant improvements in mobility and in the reduction of emissions. The use of an intelligent carpooling system also implies additional benefits at acceptable and easily recoverable cost.

POLICY RECOMMENDATION 10

Strategies are required to reduce the number of vehicles that arrive on specific areas of a city (such as on the university campus) on a daily basis, as this would bring a series of financial and social benefits for the city. This would encourage interaction between users of different professional and academic backgrounds, in line with the business and social objectives related to the promotion of collaboration and multidisciplinary innovation initiatives.

Policies are required, which allow for the implementation of such concepts while enabling the collection of high-value data on user mobility that can be used to design new strategic options to further reduce the use of private vehicles.

CASE STUDY 2

For case study 2 - a C-ITS solution to manage the drivers' behaviour crossing traffic lights intersections - there is a current need to look out for innovative solutions to the growing issues derived from traffic congestion in and around European cities, to ensure liveable urban environments. Cooperative Intelligent Transport Systems (C-ITS) that rely in the integration of platforms and applications for the exchange of transport data have the potential to deliver significant energy efficiency improvements, reduce travel time and increase drivers comfort. C-ITS would also bring additional benefits as it will prepare the transport industry for the adoption and implementation of future technology-based products and services, such as autonomous driving systems.

POLICY RECOMMENDATION 11

Policies are required which help local authorities and entities responsible for traffic management to overcome the administrative issues relating to the maintenance and upgrading of C-ITS infrastructure, to guarantee the interoperability of different systems to manage traffic flow.

CASE STUDY 3

Case study 3 refers to a track-and-trace service, that allows to share information between partners in an easy way and can predict the estimated time of arrival. This can contribute to more efficient hinterland transport and will result in lower costs for users. It also may result in a modal shift of hinterland transport from road to inland navigation, resulting in various societal benefits (e.g. less CO2 and air polluting emissions). There is evidence that the costs of the service significantly outweigh the benefits, not only at the societal level but also at the level of individual stakeholders. It is therefore believed that there will be a willingness to pay of potential users of this service. The fee structure for the service needs to be developed in line with the expected benefits for the different user groups. To ensure the successful operation of the service, it seems to be critical that the ICT company operating the services is supported by a large logistic partner with an extensive network in container logistics.

POLICY RECOMMENDATION 12

Since track-and-trace services enable efficient hinterland transport and societal benefits potentially leading to a modal shift of hinterland transport from road to inland navigation, policies are required which stimulate the development of such services by aligning the costs and benefits of C-ITS companies operating the services and their logistic partners.

CASE STUDY 4

For case study 4 - a knowledge-based approach to understanding railways safety - there is a need to develop more effective ways to manage the railway infrastructure. Predictive maintenance has the potential to deliver huge financial and non-financial rewards: reducing operating costs, extending a railway fleet's lifetime, reducing delays and disruptions, improving safety and customer satisfaction. Predictive maintenance would also bring additional benefits as it will prepare the railway industry for the adoption and implementation of future technology-based products and services. The financial cost of implementing a predictive maintenance strategy would be recovered within a short period of time.

POLICY RECOMMENDATION 13

New policies are required that encourage collaboration and support railway infrastructure owners and operators across the EU in the implementation and standardisation of a purpose-oriented maintenance system that uses information on railway infrastructure models, planned and completed maintenance work, the condition of the railway infrastructure, functional faults, incidents and accidents, to deliver the benefits of predictive maintenance, primarily in safety, reliability and comfort for passenger and communities.

Supporting ITS stakeholder's collaboration

Collaboration is a key factor for a viable business ecosystem in an inter-connected and digitalised world. 'Communities of Interest' (CoI) are flexible agglomerations of different stakeholders that share common goals, interests and/or environments. As a CoI represent an integral part of a holistic intelligence process focusing on all actors operating and competing in markets or business ecosystems, they create a momentum to drive the development of new business models for ITS.

POLICY RECOMMENDATION 14

Policy makers can facilitate the collaboration of ITS stakeholders in order to foster a network-based business modelling process by (1) becoming members of the proposed communities, (2) supporting the membership of all stakeholders covering major ITS fields and by (3) publishing and openly negotiating their policies.

Furthermore, maintaining a comprehensive repository of results of implemented ITS pilot projects helps to ensure that lessons learnt are effectively shared among stakeholders to further improve ITS business models.

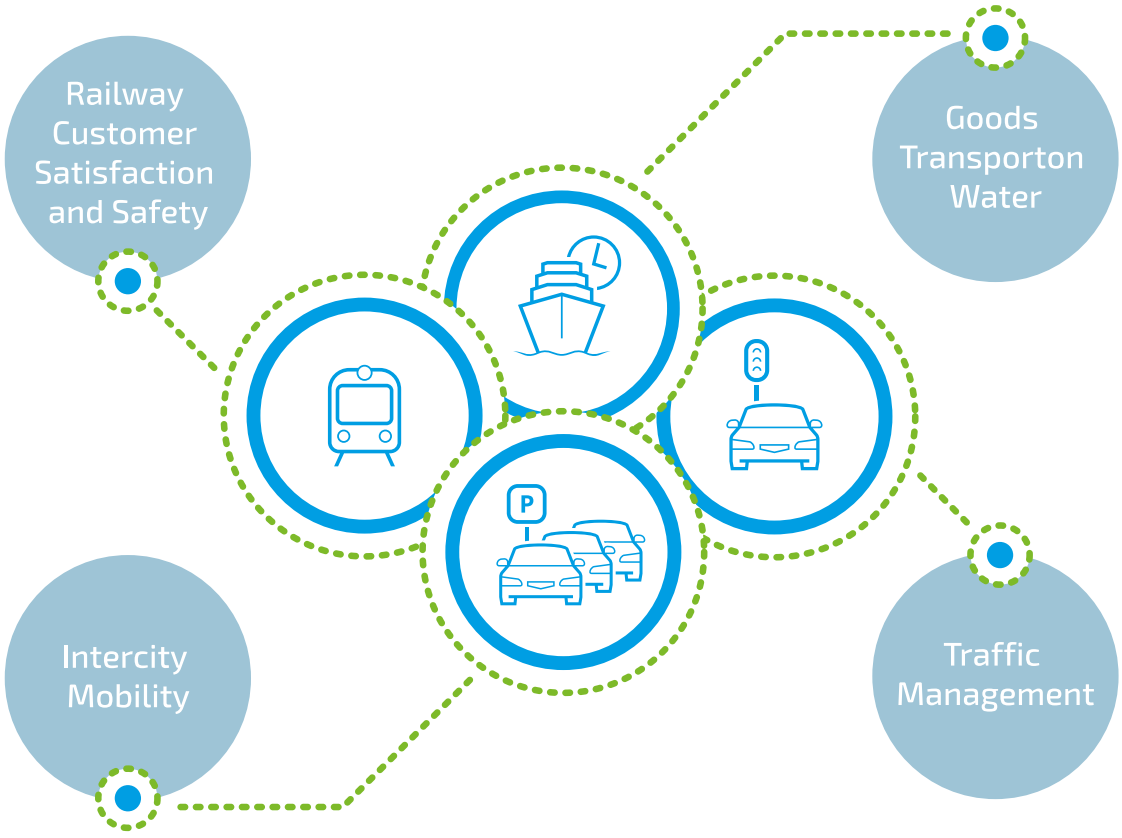
Integrating the concept of 'community of interest' and endorsing the use of collaboration platforms (such as the NEWBITS Network platform, NNP) in the policy-making process can greatly support the deployment of ITS solutions at regional level.

NEWBITS' measures supporting ITS stakeholder collaboration

NEWBITS has created an online collaboration platform (NEWBITS Network Platform, NNP) designed to accommodate a Community of Interest (CoI). The CoI is configured to foster a fully integrated network approach to craft business models for ITS.

The NNP aims at becoming an ITS-focused information and collaboration tool to foster awareness raising around relevant ITS projects, ideas, products and services globally.

Representing key ITS business areas, market segments and transport modes, there are four groups in the CoI that are distinguished according to the following applications:



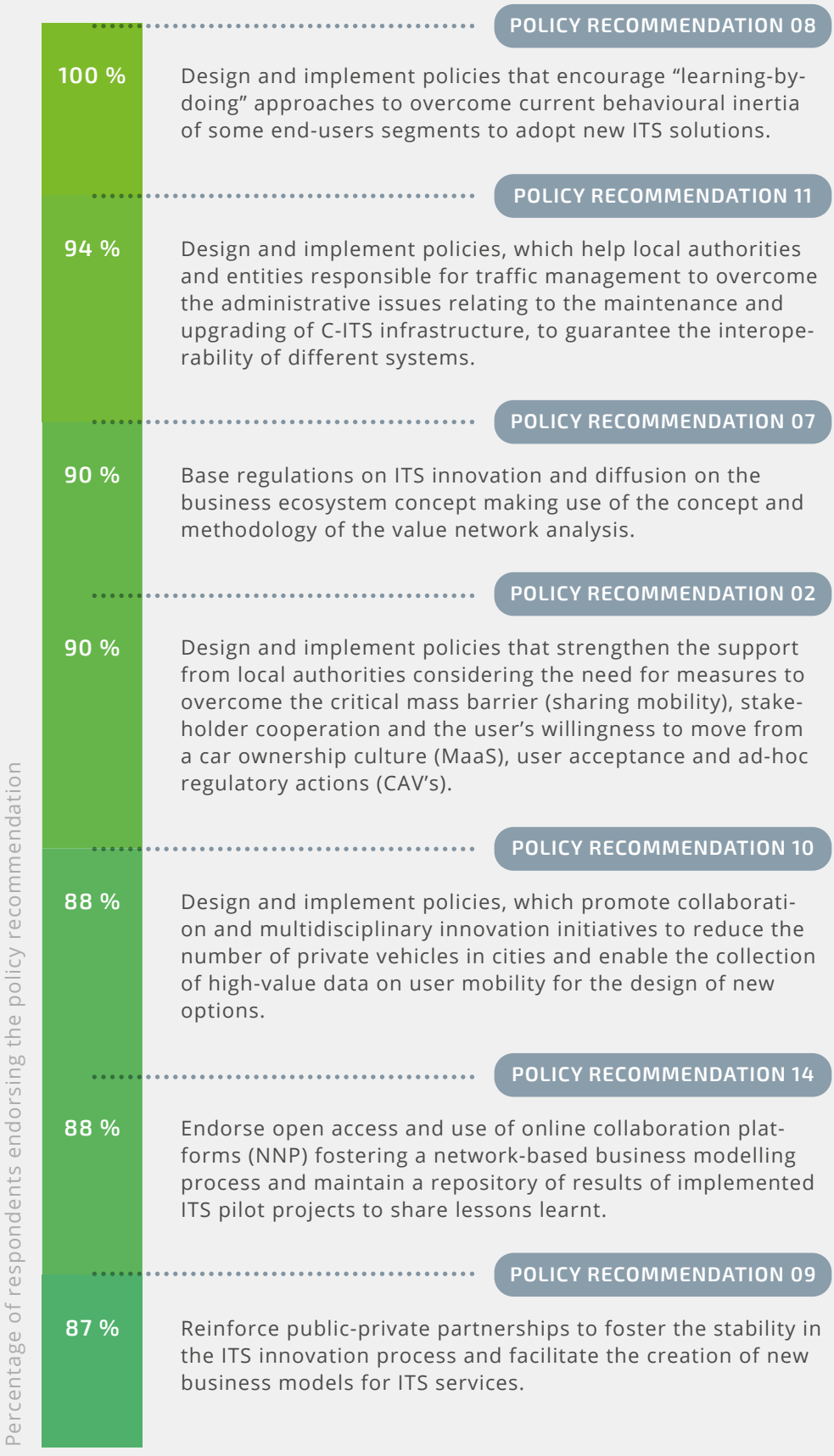
These groups attract relevant stakeholders from cities, transport authorities, infrastructure owners, transport operators, ITS service providers, academia, funding bodies, ITS associations, and end users. Core functions and tools of the NNP comprise: i) a news section – to share information on ITS related issues; ii) a networking space – to foster interaction among stakeholders; and iii) a showcase of novel ITS projects, ideas, products and services – to attract potential clients.

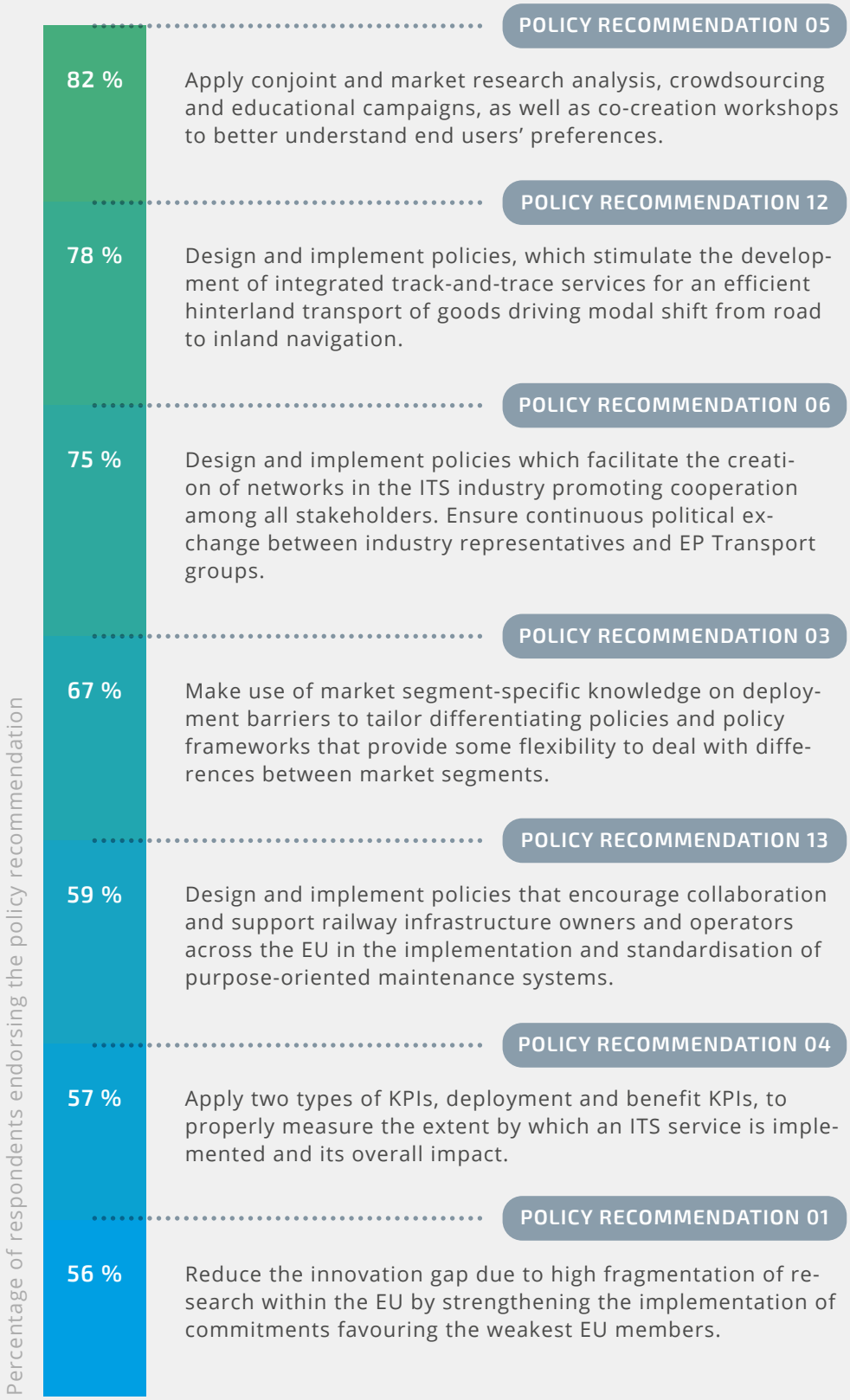
Outcome of the NEWBITS final conference - Priority rating of policy recommendations

On 21st of March 2019, the NEWBITS consortium presented its 14 policy recommendations for accelerating ITS deployment across Europe in a round table at the European Parliament in Brussels.

In an interactive session with guests from the European Commission (DG MOVE), the European Parliament (ECR Group), as well as representatives of stakeholders, industry speakers and members of the ITS community, the NEWBITS consortium highlighted the necessity of policy approaches to allow the emergence of new business models for ITS services.

Through an online poll on the NEWBITS Network Platform, the representatives were asked what priority should be placed on each of the 14 policy recommendations. The rating results validated and re-confirmed the recommendations, which were given as major directions in this policy field.


Percentage of respondents endorsing the policy recommendation
POLICY RECOMMENDATION 08
100 %
Design and implement policies that encourage "learning-by-doing" approaches to overcome current behavioural inertia of some end-users segments to adopt new ITS solutions.
POLICY RECOMMENDATION 11
94 %
Design and implement policies, which help local authorities and entities responsible for traffic management to overcome the administrative issues relating to the maintenance and upgrading of C-ITS infrastructure, to guarantee the interoperability of different systems.
POLICY RECOMMENDATION 07
90 %
Base regulations on ITS innovation and diffusion on the business ecosystem concept making use of the concept and methodology of the value network analysis.
POLICY RECOMMENDATION 02
90 %
Design and implement policies that strengthen the support from local authorities considering the need for measures to overcome the critical mass barrier (sharing mobility), stakeholder cooperation and the user's willingness to move from a car ownership culture (MaaS), user acceptance and ad-hoc regulatory actions (CAV's).
POLICY RECOMMENDATION 10
88 %
Design and implement policies, which promote collaboration and multidisciplinary innovation initiatives to reduce the number of private vehicles in cities and enable the collection of high-value data on user mobility for the design of new options.
POLICY RECOMMENDATION 14
88 %
Endorse open access and use of online collaboration platforms (NNP) fostering a network-based business modelling process and maintain a repository of results of implemented ITS pilot projects to share lessons learnt.
POLICY RECOMMENDATION 09
87 %
Reinforce public-private partnerships to foster the stability in the ITS innovation process and facilitate the creation of new business models for ITS services.


Percentage of respondents endorsing the policy recommendation
82 %
POLICY RECOMMENDATION 05
Apply conjoint and market research analysis, crowdsourcing and educational campaigns, as well as co-creation workshops to better understand end users' preferences.
78 %
POLICY RECOMMENDATION 12
Design and implement policies, which stimulate the development of integrated track-and-trace services for an efficient hinterland transport of goods driving modal shift from road to inland navigation.
75 %
POLICY RECOMMENDATION 06
Design and implement policies which facilitate the creation of networks in the ITS industry promoting cooperation among all stakeholders. Ensure continuous political exchange between industry representatives and EP Transport groups.
67 %
POLICY RECOMMENDATION 03
Make use of market segment-specific knowledge on deployment barriers to tailor differentiating policies and policy frameworks that provide some flexibility to deal with differences between market segments.
59 %
POLICY RECOMMENDATION 13
Design and implement policies that encourage collaboration and support railway infrastructure owners and operators across the EU in the implementation and standardisation of purpose-oriented maintenance systems.
57 %
POLICY RECOMMENDATION 04
Apply two types of KPIs, deployment and benefit KPIs, to properly measure the extent by which an ITS service is implemented and its overall impact.
56 %
POLICY RECOMMENDATION 01
Reduce the innovation gap due to high fragmentation of research within the EU by strengthening the implementation of commitments favouring the weakest EU members.

– Definitions –

ATIS	Advanced Traveler Information Systems	ITS services that 'provide drivers with real-time travel and traffic information, such as transit routes and schedules; navigation directions; and information about delays due to congestion, accidents, weather conditions, or road repair work'.[13]
ATMS	Advanced Traffic Management System	'ITS services that focus on traffic control devices, such as traffic signals, ramp metering, and the dynamic (or "variable") message signs on highways that provide drivers real-time messaging about traffic or highway status'.[13]
APTS	Advanced Public Transportation System	'ITS services that enable transit vehicles, whether bus or rail, to report their current location, making it possible for traffic operations managers to construct a real-time view of the status of all assets in the public transportation system'.[13]
ATPS	Advanced Transportation Pricing System	,ITS-enabled transportation pricing system is mainly used for electronic toll collection purpose, through which the drivers can pay tolls automatically through the on-board device. Other applications which are included in this segment are: congestion charging, fee high-occupancy toll lanes and vehicle-miles travelled usage fees'.[14]
CVS	Cooperative Vehicle System	'A subset of the overall ITS that communicates and shares information between ITS stations to give advice or facilitate actions with the objective of improving safety, sustainability, efficiency and comfort beyond the scope of standalone systems'.[15]
ITS	Intelligent Transport Systems	The application of information and communication technologies (ICT) in transport. It is considered that the main function of ITS is to increase the efficiency in the transport system, with special focus on the service and information provision for the full spectrum of users (drivers, passengers, vehicle owners, network operators, etc.) which involves a diversity of stakeholders (network operators). ITS in its more simplistic definition[16,17] refers to the application of information and communication technologies (ICT) to the transport sector. ITS services in turn are defined as the combined use of ITS technologies in order to fulfil user requirements related to a transport mode (or the integration of more than one transport mode) on a certain market.[18]

- Notes -

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If sources are not named directly, this brochure is based upon the work of the partners within the EU-funded NEWBITS project. Further information on the deliverables and outcomes of the project can be found under www.newbits-project.eu/publications.

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