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COMMISSION STAFF WORKING DOCUMENT

Mobilising Intelligent Transport Systems for EU cities

Accompanying the document

**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

Together towards competitive and resource-efficient urban mobility

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I. INTRODUCTION

Smart technologies and Intelligent Transport Systems (ITS) in particular can significantly contribute to a cleaner, safer and more efficient transport system in urban areas. Innovative transport solutions can also meet ever-growing citizens' needs in terms of new mobility services such as car sharing and bike sharing schemes or smart ticketing solutions, for instance.

ITS are key enablers to achieve public policy objectives, support the design of urban mobility and offer tailor-made measures, adapted to the wide variety of urban mobility scenarios. ITS can provide very concrete solutions, for example for traffic and travel operations and management, thus reducing congestion and its resulting negative externalities. As such multi-functional ITS can be used for different purposes under different conditions, applicable to all transport modes and mobility services, both for passengers and freight. This explains why intelligent transport solutions are at the core of the Urban Mobility Package. They constitute instrumental tools, on which to rely while designing Sustainable Urban Mobility Plans, supporting access restriction schemes, smooth operation of city logistics and enhancing road safety measures.

The full potential of ITS can only be realised if their deployment in Europe evolves from the limited and fragmented, as it is still today, to an EU-wide and continuous one. Trans-national deployment of seamless cross-border services for travel information and traffic management cannot be achieved by the Member States alone. Urban areas are critical to achieving these objectives, as they constitute important nodes on the trans-European road network ensuring the smooth link to interurban transport networks.

II. POLICY BACKGROUND

Although ITS have already been developed for more than 20 years, their deployment is still uneven across the European Union, its Member States and urban areas. Despite a high number of technical solutions and mature applications, and the multiplication of commendable local initiatives, the uptake of ITS applications is fragmented and large differences between cities remain. The main reasons behind such a state of facts are the lack of both interoperability and of effective cooperation, coupled to organizational and financial barriers.

Against this backdrop, the Commission put forward in 2008 an Action Plan for the Deployment of Intelligent Transport Systems in Europe¹ and an accompanying Directive²

¹ Communication from the Commission, "Action Plan for the Deployment of Intelligent Transport Systems in Europe", COM (2008) 0886 final/2

which provide 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.

In the domain of urban mobility, the ITS Action Plan called for the set-up of an ITS collaboration platform to promote urban ITS initiatives, in alignment with the Action Plan on Urban Mobility (2009), which proposed to offer assistance on ITS applications for urban mobility, possibly in the form of a guidance document.

As a part of the implementation of the aforementioned Action Plans, the Commission established in December 2010 an Expert Group on Urban ITS³ 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 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, in a consensual and bottom-up approach, a set of Guidelines for the deployment of key ITS applications in urban areas⁴, the executive summary of which is annexed to this document. It also collected related best practices and made recommendations for further standardisation in the domain of urban ITS.

Also the White Paper "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system"⁵ reasserted the positive contribution that ITS can make to smart and efficient (eco) mobility through a number of measures such as optimised traffic management and city logistics, seamless travel information and integrated / intermodal ticketing, charging and payment systems in the context of access restriction or parking management, and (on-board) road safety devices to name a few.

III. URBAN TRENDS IN ITS

Today the density of the road network is already very high, and building new infrastructures ceases to be a viable option, especially in European urban areas, which feature limited space availability in general, and preserved historical centres in many cases. Furthermore, in times of scarce financial resources, any new investment constitutes a burden upon tight public budgets. For that reason, local authorities, while devising their urban transport and mobility policies look for achieving the best return on investment, and ensuring consistency and continuity with other local and regional solutions. They also need to optimise the use of the existing infrastructures, in terms of space and time, in order to better accommodate and manage the ever increasing demand for mobility.

Deploying ITS solutions grounded in open standards and common specifications contributes to foster inter-urban, inter-regional and ultimately pan-European interoperability. It also safeguards the sustainability of the investment made and helps to avoid vendor lock-in solutions that are more expensive for upgrade and maintenance. Furthermore, ITS enable to better connect the existing networks and foster a more extensive use of collective and soft

² 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.

³ <http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=2520>

⁴ See http://ec.europa.eu/transport/themes/its/road/action_plan/its_for_urban_areas_en.htm for full documentation.

⁵ White Paper "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system", COM (2011) 0144 final.

transport modes, more efficient use of private vehicles and their integration in multimodal combinations, and flexible allocation and use of limited space for both transport and logistics purposes.

ITS, given the fast pace of technological innovation, are constantly evolving. More solutions and tools are developed, and the variety and amount of data (static, dynamic, floating, etc.) is constantly increasing. A new trend towards Open Data, or Open Access, is emerging these days, with an increasing number of national or local initiatives and pilots launched in order to enhance the scope and quality of the accessible data, as well as develop new mobility services, and travel or traffic applications. The standardisation of data formats and interfaces for new mobility services (such as bike sharing schemes, car sharing, and carpooling) and their introduction into multimodal information systems, including applications for booking, payment and ticketing, could considerably contribute to promoting more sustainable (multimodal) mobility. The creation of comprehensive multimodal datasets in urban areas, including data from all transport modes and mobility services, can foster the development of high quality information services for end-users and ensure a fair competition among private information service providers, while respecting and protecting the interests of transport and infrastructure operators. The control of such datasets by public authorities will guarantee the consistency of the services provided with public policies.

Therefore, the development of user-friendly and flexible multi-application devices into which different standardised or tailor made ITS applications can be fitted also opens up the opportunity for new business cases (e.g. NFC phones, satellite navigation libraries). Such innovative applications could support the alleviation of parking pressure, by provision of real-time parking information including booking options, the establishment of automatized access restriction schemes (for specific types of vehicles or deliveries), and better management of city logistics (e.g. by booking loading bays).

Furthermore, both private and public transport vehicles fitted with on-board devices (e.g. GPS) and sensors become more and more capable of communicating among themselves and with the surrounding infrastructures. Such cooperative systems can be used with benefit for urban applications, whether in the form of fleet management measures (e.g. public transport prioritisation at crossroads) or road safety ones (e.g. blind spot warning, Vulnerable Road Users detection). They can also provide the car drivers with personalised assistance during their trips (e.g. real-time traffic information, driving assistance) or support the rationalising of traffic and parking (e.g. by enabling a shared use of bus lanes or (un)loading bays, during peak hours or for specific situations).

In this context of multiplication of ITS solutions responding to or anticipating urban trends, it is crucial to ensure future interoperability of systems and of data formats to foster multi/inter/co-modality and facilitate data sharing and processing for different innovative services to flourish.

IV. THE BENEFITS OF ITS DEPLOYMENT IN URBAN AREAS

ITS can only be deployed to their optimal effect, when they are applied within a strategic framework, aligned with transparent policy goals and with clear roles distributed among all relevant stakeholders. For that reason, an integrated approach including different transport modes and mobility services, and bringing together both technical and policy considerations is needed.

Furthermore, the deployment of ITS applications should be both customer- and market-oriented in order to provide useful and efficient services. To this end, user acceptance and

strong (local) political support are important issues for any new system or service to be deployed successfully.

A cost-effective ITS deployment can be fostered by (cost-sharing) public-private partnerships, targeted at creating market opportunities for the deployment of multi-purposes equipment and applications. Moreover, using joint public procurement and innovative procurement can help authorities to generate cost savings (e.g. obtain lower prices, and save administrative costs) and contribute to capacity building (e.g. via sharing of skills and expertise among authorities).

A non-discriminatory access to traffic and travel data, notably via multimodal transport databases, and clear rules for data sharing among public and private stakeholders constitute a facilitator to a number of ITS applications (e.g. multimodal information, traffic management). It can also stimulate the emergence of new business opportunities and new services for citizens, enhance data quality, and support sustainable urban mobility policy making, implementation, monitoring and evaluation.

Finally, the monitoring of the deployment of ITS applications, and evaluation of their impacts (based on existing methodologies, outcomes of past projects e.g. CONDUITS⁶, 2DECIDE⁷, as well as broadly accepted Key Performance Indicators (KPIs)), can greatly help decision-makers in selecting the right ITS applications (or combination of ITS applications), in order to achieve their policy goals. For that aim, the exchange of best practices should not be underestimated.

More practically, the following examples illustrate which benefits can be harnessed with use of some key ITS applications:

1. **(Real-time) Multimodal travel and traffic information** can help achieving a better modal integration, and optimising freight routing and deliveries, therefore alleviating serious bottlenecks along the networks, reducing congestion, improving air quality and quality of life as a whole. Such ITS applications can also help to better manage demand and network capacity, with benefits for end-users (i.e. better services) and operators (i.e. optimisation of performance and better cost efficiency).

The European project In-Time⁸ aims at reducing energy consumption in urban transport through the change of mobility behaviour of travellers, by providing multimodal Real-time Traffic and Travel Information. It estimates that potential changes in the mobility behaviour that can be reached with good quality multimodal information services are approx. 3% of modal shift.

The City of Ghent (Belgium)⁹ deployed a sustainability-oriented multimodal traffic management system, integrating variable message signs (VMS) for traffic information, traffic lights management and parking guidance system. It contributed notably to increasing the commercial speed of public transport on the main tram axe by 5%; increasing the use of Park+Ride facilities by 10%; and reducing the number of cars in the city centre.

⁶ www.isis-it.com/wordpress/portfolio-items/conduits

⁷ www.2decide.eu

⁸ The Collection of Best Practices of the Urban ITS Expert Group, http://ec.europa.eu/transport/themes/its/road/action_plan/doc/2013-urban-its-expert_group-best-practice-collection.pdf, pages 71-72.

⁹ <http://www.civitas-initiative.org/content/sustainable-multi-modal-traffic-management>

2. **Traffic management measures** can help to reduce congestion through better management of traffic operations. In this context ITS can help to reduce emissions and save energy through better demand management. While access management schemes (incl. road user charging) can be implemented without an ITS component, intelligent systems allow for more efficiency and a better return on investment, through automation of processes and better enforcement of rules.

The deployment of an Adaptive Traffic Signal Control (SPOT) System in Aalborg (Denmark)¹⁰ allowed decreasing transportation time in average by 25 minutes (-8.5%) per trip in the peak hours, on the most congested part of the main ring road, Østre Alle. The smoother driving pattern also allowed decreasing fuel consumption by 2.45%.

The deployment of Tram and Bus Priority at Traffic Signal, “Green Waves”, including 240 prioritising traffic signal systems, in Munich (Germany)¹¹ allowed increasing travelling speed of private individual traffic by 15% and reducing the number of delayed trips of public transport by 38%.

3. **Multimodal smart ticketing** when integrated with information services could be used to provide statistical data on passengers’ trips to transport operators (duly respecting privacy and anonymity requirements), in order to optimise networks’ usage and public transport operations. For instance, smart ticketing solutions help collecting fares more efficiently, thus reducing fraud, and contribute to the increase of the commercial speed of public transport, through the optimisation of loading times. The new ticketing channels are generally cheaper to operate than the traditional ones, if deployed following a well thought migration strategy. Furthermore, smart ticketing can be used to improve parking management (i.e. booking, access and payment).

A number of examples of deployment of smart ticketing solutions show a noticeable reduction in terms of delays, or passenger fraud, and demonstrate gains in terms of passenger flows (e.g. London's Oyster card¹² allowed to double the number of people through gate per minute from 20 to 40, in comparison to magnetic ticket), and attractiveness of public transport. Positive outcomes have been reported for the electronic ticketing systems in Toulouse (France)¹³ or La Rochelle (France)¹⁴.

Smart Card Ticketing, e.g. t-card deployed in Trondheim (Norway)¹⁵, enabled a reduction of boarding and paying time by 6.8 seconds per passenger, an average 10% reduction on travel time leading to a passenger growth estimated at between 3 to 7%. Furthermore, the smart card system has a benefit-cost ratio of 1.5 (meaning that 1€ spent generates benefits of 2.5€).

4. **ITS tools such as CCTV and ANPR technologies** can strongly facilitate enforcement. These tools have also made electronic tolling, road user charging and low emission zones (LEZs) viable options, helping to achieve reduction of congestion, promote modal shift and improve air quality within the largest European cities.

¹⁰ <http://www.civitas-initiative.org/content/congestion-monitoring-using-telematics>

¹¹ The Collection of Best Practices of the Urban ITS Expert Group, pages 15-16.

¹² The Collection of Best Practices of the Urban ITS Expert Group, pages 160-161.

¹³ The Collection of Best Practices of the Urban ITS Expert Group, pages 82-83.

¹⁴ The Collection of Best Practices of the Urban ITS Expert Group, pages 88-89.

¹⁵ The Collection of Best Practices of the Urban ITS Expert Group, pages 128-129.

Oslo (Norway) deployed an ITS-Based Toll Collection system¹⁶, which enhanced traffic flow. It has a positive impact on noise reduction and greenhouse emissions due to faster movement of vehicles and reduction of fuel consumption of 35% compared to manual tolling. The cost-benefit ratio of the scheme is deemed at 4.90 (each €1 invested generates €5.90).

Bologna (Italy) deployed a system of restricted access to controlled areas, SIRIO¹⁷, which led to the reduction of absolute traffic (between 23 and 32%), and also of congestion and of parking pressure. It also contributed to decreasing particles emission (-47%).

5. New in-vehicle safety and driver assistance systems intervene before the accident happens. Given that more than 90% of all accidents are caused by human error, in-vehicles devices, potentially able to communicate with the surrounding environment/ infrastructure (i.e. cooperative systems), are essential to enhance road safety.

A tool box cross-referencing a sample of transport policy objectives, associated tactics and implementing measures for which ITS have the potential to further enhance the efficiency and cost-effectiveness of urban mobility is provided in the annex.

V. NEXT STEPS

In order to achieve the benefit of urban ITS to the fullest, there is a need for action at every administrative level: local, national and European. The Commission services, with a view to foster the coordinated and seamless deployment of ITS up to the very centre of European cities, continue to work on:

(1) Taking forward work on supplementing the existing legislation on access to and re-use of data, in order to unlock the potential lying in transport data, through appropriate instruments:

The Directive on the re-use of public sector information (PSI)¹⁸ introduced in 2003 a legislative framework for the re-use of public sector bodies' information. Its provisions are often insufficient in the transport domain, given the complex nature of transport undertakings. The recent revision of the PSI Directive¹⁹, in the scope of the Commission's Digital Agenda for Europe²⁰ and Open Data Strategy²¹, aiming at promoting more access to data (not only its re-use), are not likely to resolve a number of remaining problems for transport, where there is still much unlocked potential.

For the abovementioned reasons, the Commission is currently assessing impacts of promoting wider access to public and private travel and traffic data, in view of presenting a specific initiative on that matter by the end of 2014. Such initiative would be duly accompanied by provisions regarding rules of data access and re-use and data confidentiality. It would enter in line with a growing local and national commitment to Open Data policies, rely on existing best practices (and standards), and help local actors to establish their own Open Data regimes, also by providing financial support under Horizon 2020.

¹⁶ The Collection of Best Practices of the Urban ITS Expert Group, pages 126-127.

¹⁷ The Collection of Best Practices of the Urban ITS Expert Group, pages 92-93.

¹⁸ Directive 2003/98/EC of the European Parliament and of the Council of 17 November 2003 on the re-use of public sector information, OJ L 345, 31.12.2003, p. 90.

¹⁹ Directive 2013/37/EU of the European Parliament and of the Council of 26 June 2013 amending Directive 2003/98/EC of the re-use of public sector information, OJ L 175, 27.6.2013, p. 1.

²⁰ Communication from the Commission "The Digital Agenda for Europe – Driving European growth digitally", COM (2012) 784 final.

²¹ Communication from the Commission: "Open data – an engine for innovation, growth and transparent governance"; COM (2011) 882 final.

(2) Preparing specifications as foreseen under the framework of the ITS Directive:

The ITS Directive (2010/40/EU) confers to the Commission the power to adopt delegated acts as regards specifications. Work on the specifications for EU-wide multimodal travel information services (priority action a), and EU-wide real-time traffic information services (priority action b), will be carried out by the Commission services. These specifications will be of critical importance for a seamless door-to-door mobility and coordinated deployment of ITS across borders and at the interfaces between urban-interurban networks;

(3) Facilitating the deployment of Cooperative Systems in urban areas by developing a roadmap and building consensus among relevant stakeholders:

Cooperative Systems (including vehicle-to-vehicle and vehicle-to-infrastructure communication systems) can contribute to better achieving traffic management objectives and enhance road safety in urban areas. Their successful deployment will require a broad stakeholders' cooperation, which will be supported by the Commission notably via research & development, further standardisation efforts, and large scale deployment pilot projects.

Member States should consider using the Guidelines when key ITS applications are deployed in their conurbations, developing proper interfaces between urban and surrounding interurban transport networks, and setting-up interoperable multimodal datasets gathering all information about urban mobility.

VI. CONCLUSION

Sustainable Urban Mobility Plans are a medium for European conurbations to establish and develop the right ecosystem fostering the efficiency of their urban transport system, while addressing citizens' and businesses' needs, in accordance with their policy objectives.

In this context urban ITS can help to optimise existing infrastructures and to trigger new services to enhance the quality of life in urban areas. ITS should be adapted to the particularly complex characteristics of urban mobility, hence embedded in any sustainable urban mobility policy.

ITS are also important for economic development and innovation. It is notably the case when it comes to access to data. Business opportunities can emerge from a broad access to public and private data on mobility, traffic and transport. It will encourage the development of innovative services (including by SMEs) that are sustainable and economically autonomous, providing citizens rapidly with mobility services at reasonable prices.

In an age of co-modality, when the car is getting smarter and smarter, and the types and sources of data larger and larger, new economic models combining different transport modes and services emerge with ITS as a core element (e.g. multimodal travel information and planning services, smart ticketing, real time traffic information, cooperative systems).

Although the effectiveness of ITS tools/applications for dealing with urban mobility issues is well acknowledged, fragmentation remains an issue to be tackled through wide spreading of interoperable solutions and broad collaboration of all the stakeholders.

ANNEX I - ITS-SUPPORTED TOOL BOX²²

TRANSPORT POLICY OBJECTIVES	POLICY TOOLS	MEASURES	ITS COMPONENTS
Reduce Congestion	<ul style="list-style-type: none"> - Demand management - Traffic management - City access restriction 	<ul style="list-style-type: none"> - Congestion charging - Incident detection - Parking space management - Promotion of soft modes and public transport 	<ul style="list-style-type: none"> - Algorithms - Communication networks and media (wireless and wired) - Data, datasets, databases - Digital maps - Handheld devices - Human machine interfaces - Inductive loops - Interfaces, including APIs (Application Programming Interface) - Models - Monitoring and detection systems, including ANPR (Automatic Number Plate Recognition) and CCTV (Closed Circuit Television) - Sensors - Software - Traffic signals - Traffic control centres
Decrease parking pressure	<ul style="list-style-type: none"> - Demand management - City logistics strategy 	<ul style="list-style-type: none"> - Parking space management - Loading bay management - Freight consolidation centres 	
Modal Shift / Increase attractiveness of public transport	<ul style="list-style-type: none"> - Demand management - City access restriction - Enhancement of public transport 	<ul style="list-style-type: none"> - Multimodal information - Smart ticketing - Priority lanes for public transport 	
Reduce energy consumption / emissions	<ul style="list-style-type: none"> - Demand Management - Traffic management - City access restriction 	<ul style="list-style-type: none"> - Multimodal information - Green waves - Low Emission Zones (LEZs) 	
Enhance road safety	<ul style="list-style-type: none"> - Casualty reduction - Speed reduction - Cooperative systems strategy 	<ul style="list-style-type: none"> - Incident detection - Targeting accident hotspots - Low speed zones - I2V communication 	
Facilitate freight delivery & servicing	<ul style="list-style-type: none"> - City logistics strategy 	<ul style="list-style-type: none"> - Loading bay management - Parking space management - Freight consolidation centres 	

²²

Adapted from the Guidelines for ITS Deployment – Traffic Management, Urban ITS Expert Group, December 2012. Annex A, p. 21.

		- (GPS based) Fleet operations systems	
Increase efficiency of transport system	<ul style="list-style-type: none"> - Traffic management - Demand management - Cooperative systems strategy 	<ul style="list-style-type: none"> - Multimodal information - Smart ticketing - Green waves - Parking space management - Incident detection - V2I communication 	
Improve quality of life in cities	<ul style="list-style-type: none"> - Demand management - Traffic management - City access restriction - Enhancement of public transport - Casualty reduction 	<ul style="list-style-type: none"> - Low Emission Zones (LEZs) - Congestion charging - Promotion of soft modes - Targeting accident hotspots - Parking space management 	

ANNEX II – ENABLERS FOR INTEROPERABLE AND CONTINUOUS ITS DEPLOYMENT IN URBAN AREAS

Measure	Level of action
Provision of guidance on ITS deployment ²³	European
Exchange of best practices	European ²⁴ , National
Creation of feedback loops	National, Local
Monitoring and evaluation of the deployment of different ITS applications, and their bundles	National, Local
Adoption of National ITS deployment plans	National
Creation of urban-interurban interfaces	National, Local
Elaboration of a strategy for local ITS deployment, integrated within Sustainable Urban Mobility Plan	Local
Using the Guidelines developed by the Urban ITS Expert group for ITS deployment of key applications	Local
Encouraging broad inter-institutional and administratively inclusive cooperation, with clearly defined and allocated roles	National, Local
Fostering public-private partnerships	European, National
Fostering joint and innovative public procurement	National
Standardisation	European, with involvement of national and local experts
Use of open standards, architectures and specifications	National, Local
Funding (research, large-scale demonstration projects)	European ²⁵ , National
Creation of (multimodal) transport datasets	National, Local

²³ http://ec.europa.eu/transport/themes/its/road/action_plan/its_for_urban_areas_en.htm

²⁴ Notably via ELTIS website, www.eltis.org, or in the context of the European Innovation Partnership on Smart Cities and Communities, www.eu-smartcities.eu.

²⁵ Notably via Horizon 2020, the European Structural and Investment Funds, or Connecting Europe Facility

ANNEX III - GUIDELINES FOR ITS DEPLOYMENT IN URBAN AREAS, PREPARED BY THE URBAN ITS EXPERT GROUP²⁶

EXECUTIVE SUMMARY

1. PUBLIC POLICY GOALS

Mobility issues are increasingly important in today's fast-growing urban centres all over the world, but particularly in the European Union where 75% of inhabitants live in urban areas. At the same time the supply of mobility services is continuously increasing as well as people's demand for complete, more reliable, real-time and easy to use travel information.

The cities have 4 main objectives in terms of mobility policy:

- Ease the movement of people and goods, and answer to the citizens' demand for reliable and easy to use mobility and travel information,
- Ensure accessibility of the towns and their economic development,
- Reduce environmental and socio-economic impacts of transport,
- Re-conquer public space from individuals private car use for eco-friendly modes and urban planning.

The investments made in new transport infrastructures were massive in the past decades all over Europe. Furthermore, in the last 10 years, the modal share of private car use in most of European conurbations has only slowly decreased. In urban regions, where there is limited capacity to construct new infrastructure, the current need is to optimise its use, by implementing solutions based on new technological tools and connecting different networks. ITS are promising tools to address the urban mobility policy objectives.

2. THE URBAN ITS EXPERT GROUP

Resulting from the provisions of the ITS Action Plan (2008), and Action Plan on Urban Mobility (2009), both foreseeing that Commission will offer assistance and foster cooperation on ITS applications for urban mobility, the Expert Group "ITS for Urban areas" was set up in December 2010 for 24 months.

The Expert Group was multi-modal in its focus, broad in nature and covered the urban regions, taking into account their diversity, and the need for interfaces between the urban and inter-urban mobility. Both passenger and freight issues were considered and a dialogue between public and private stakeholders encouraged.

The tasks of the Expert Group were three-fold: to provide guidance on ITS deployment in urban areas, collect best practices on successful deployment and identify a possible need of standardisation.

The group developed specific Guidelines to promote and show the benefits of the use of ITS in urban areas along the individual travellers' mobility chain. These Guidelines aim to foster interoperability and continuity of services within Europe. The Guidelines are targeted at the organisations in charge of decision making and technical deployment of ITS on local level.

For each key application of urban ITS a separate document has been issued:

²⁶ Full documents available at:
http://ec.europa.eu/transport/themes/its/road/action_plan/its_for_urban_areas_en.htm

- (1) Traffic and Travel (Multimodal) Information
- (2) Smart Ticketing
- (3) Traffic Management (incl. Urban Logistics)

The structure of all three documents is similar, the same as were their objectives²⁷:

- Identify problems and challenges for deployment of key applications
- Analyse how ITS solutions can help resolving these problems and achieving public policy goals
- Identify relevant stakeholders and their roles
- Identify key points to foster deployment
- Provide recommendations

The following sections highlight the main elements of each Guideline document and recommendations provided by the experts.

A. Multimodal Information Services (MIS)

Multimodal Information can be defined as information on all modes of transportation (car including parking, public transport, railway information, bike, bike or car sharing services, car-pooling etc.) allowing the end-users to use any combination of modes to go from A to B.

In that perspective, multimodal traveller information has an important role to play and, if of good quality, it can be a strong incentive for the users to change their mobility routines, and contribute to achieving a better modal integration.

One of the main factors for understanding challenges in Multimodal Information Service deployment is the absence of autonomous business models that are still rarely viable without public support, as the users often take information for granted and are not ready to pay for it.

In this context, the Expert Group proposed the following recommendations:

- (1) Role of public and private sector:
 - The public sector shall provide Multimodal Information Service when there is no autonomous commercial economic/business model. This can be performed directly by public authorities or by the private sector through public procurements.
 - The private sector could provide multimodal information services when there are viable autonomous commercial business models. To encourage the emergence of such business models and the provision of such services, the access to public data or services should be broadened, with a stress on quality of the data. This access to data should be dependent on the coherence of the data use with the public policy on mobility;
- (2) Availability of data and/or information for each mode of transport and mobility services:
 - Setting up multimodal dataset for each European city, controlled by the public sector: Following the aforementioned positioning of the public and private stakeholders roles, it is suggested that urban public authorities should be in charge of setting up a multimodal dataset for their urban area, gathering the various sources of data of the transport operators, including real-time information, when available. This

²⁷ See full documents at http://ec.europa.eu/transport/themes/its/road/action_plan/its_for_urban_areas_en.htm

multimodal dataset should then be made available to private stakeholders, either through Open Services, or Open Data, depending on each European city's policy on information provision, allowing a fair competition between service providers, who should be able to plug their software into any urban multimodal data set and provide services to the users.

- Availability of local rail data: The Expert Group recommends an affordable - as traveller information businesses are thin - and transparent access to local rail timetable and real-time information datasets.
 - Availability of public data: Since multimodal traveller information is a tool for public policy to support public interest, the Expert Group recommends that access to data or services should be granted under the condition that the services based on the data/services provided are consistent with the modal shift policy.
 - Lack of data, quality of data and information services: The Expert Group recommends increasing the quantity and quality of mobility data, through the deployment of monitoring devices and systems, development of purposeful use of social media and the labelling of the quality of the data or services. Cooperation between public and private sector is highly recommended in this area.
- (3) Market the modal shift and traveller information services: Multimodal information is also about changing people's habits and travel behaviour. Travellers must not and cannot be 'forced' into public transportation. The choice to use multimodal information, and change one's mobility routine, must be based on pragmatic and practical grounds to guarantee longevity of the modal shift. A specific focus should be put in promoting these services and advertising the modal shift, to tap the full potential of Multimodal Information Service on modal shift.
- (4) Harmonisation and continuity of services
- The Expert Group recommends to foster cooperation between the private cars actors (car manufacturers, navigation services providers) and soft modes actors (public transport and bike services operators) to develop Multimodal Information Service that addresses user needs (continuity of services) and mobility policy objectives (modal shift).
 - To allow an easy exchange of information and decrease the software cost for Multimodal Information Service, the Expert Group recommends that the use of existing standards for new Multimodal Information Services is made mandatory and the connections between different modes (the urban multimodal dataset) and data for the new mobility services (car sharing, car-pooling, free bike services, etc.) are standardised.

B. Smart Ticketing

Smart Ticketing has been a trendy topic for over a decade now. In the context of ticketing 'smart' implies the use of new technologies and integration of ticketing with services that are not directly linked to the basic functions of tickets.

The main opportunities provided by the development of Smart Ticketing are:

- To propose complementary services to users in relation with their mobility;
- To modify the relationship between Public Transport user and his/her ticket as also between Public Transport operator and its tickets;

- To improve overall efficiency and image of Public Transport network as also the depth of data created through usage.

Smart Ticketing could contribute to the overall improvement of the public transport network level of services, image, accessibility, with the main aim to facilitate and/or increase the use of public transport and contribute to the overall political goal of developing a sustainable transport policy and promote modal shift. Smart Ticketing though is NOT necessarily about having ONE ticket (interoperability of contracts) for your journey but having ONE wallet (interoperability of support) for SEVERAL tickets.

One of the main trends reinforced by the development of Smart Ticketing is that the 'ticket' is becoming more and more personalised. The differing needs (and 'ways of consuming' Public Transport services shall be seen as a consumer good and sold/ marketed as such) of groups or communities of people are becoming a challenge for the implementation of the Transport and the Fare Policies.

Implementing Smart Ticketing also means thinking of the stakeholders and their needs, therefore how to respond to these needs and elaborate marketing accordingly. To date, the main stakeholders are clients, politicians and authorities, public transport operators, scheme providers, suppliers, payment industry, media and lobbies. Specific focus should be paid to the final user's needs (easiness, simplicity and fairness), public policy needs (shift in modal split reducing individual car use, reduction of pollution, optimisation of operational efficiency, reduction of public expenses) and the transport operator's needs (reduce operational costs of ticketing, improve fare collection efficiency, improve knowledge of customer's behaviour/choices/preferences).

Smart Ticketing should have an impact on the way Public Transport is used. Using a ticket, or wallet, not only for transportation, but also for mobility services in general could improve the image of Public Transport. Access to fare information and easier remote sales will also help the cause, whereas privacy concerns must be addressed in a code of conduct to be able to develop a trust relationship with customers.

The development of Smart Ticketing in a global urban ITS perspective has to be built in respect of local organisations and of the decentralised nature inherent to public transport and to the importance of its public funding.

The recommendations to deploy Smart Ticketing are therefore:

- General: Smart Ticketing should not be seen as a simple replacement for traditional paper or magnetic ticketing. An important step is identifying which features and functionalities of Smart Ticketing can be adopted and how they will integrate with the customers' wider mobility requirements. The introduction of Smart Ticketing is also an opportunity to rethink the current fare policy and to offer additional/alternative fare possibilities to customers.
- Business models: Smart Ticketing is a global business and is, for the first time, being driven by standards. This allows off-the-shelf technology to be adopted with only limited local tailoring to reflect specific tariff structures and cross-modal opportunities. By using open International Standards for Smart Ticketing, Public Transport Operators can access supply chains that are responsive, cheaper and use industry best practices.
- Distribution channels: Smart Ticketing must allow passengers to plan and book their travel through their choice of distribution and retail channels. This goal requires a new system that can accommodate the speed, power and flexibility necessary to

handle multiple distribution channels for ticket sales, including contactless payment and pre-loaded value.

- Smart wallets: Smart Ticketing covers not just pre-payment and the loading of a ticket onto the smartcard or phone, but can also include post-payment where the customer is identified on entering / leaving a closed system and verified that they are authorised to travel or have suitable payment mechanism available (whether that is a contactless bankcard or pre-arranged credit). A smart wallet also gives the opportunity to integrate other services whether transport related (e.g. bike or car sharing, parking), associated (e.g. tourism information) or non-transport related (e.g. shopping, use fees).
- Marketing issues / public support: Urban ITS decision makers should now systematically look for integration in such wider organisations to take benefit from the mutualisation of standard technical tool boxes as well as to insert their customer offer in a wider market.
- Organisational and legal issues: Urban and national transport decision makers should actively support the development and implementation of European and international specifications for Smart Ticketing to ensure mutual compatibility between all schemes.
- Integration with travel information and traffic management: By creating a linkage between Travel Information, Journey Planning, Payment and Smart Ticketing, including a liaison with compatible mobile phone and contactless bankcard schemes in Europe, Smart Ticketing can ensure the customer experience consistently meets their highest expectation. As a result this can foster co-modality/inter-modality. Interoperability in transport Smart Ticketing implies removing the obstacles for the customer to switching transport modes. All ticketing needs for through journeys should be in one place and on their local transport Smart Ticketing media, even outside their home network. There should be simple registration processes in place so that the customer has a standardised machine interface and easy access in his/her own language.
- Development of Smart Ticketing standards: The use of international and open standards can facilitate interoperability, the opening of global markets and compatibility between devices produced by different suppliers.
- Data privacy: Protection of the customer's privacy is an ethical requirement of confidentiality, un-linkability, un-observability and anonymity. A low level of protection not only could be punished as a violation of the law but would damage customer acceptance.

C. Traffic management

ITS can provide solutions and add value to traffic management policy formulation and operations in an urban environment. Traffic management is a very broad subject area incorporating an extremely wide range of operational tools, many of which are familiar to today's urban traveller (e.g. traffic signals) and some of which are currently still evolving (e.g. vehicle to vehicle communications).

ITS offers a variety of means to manage the road and public transport network in a co-ordinated manner, producing faster and stronger links between the traffic management authority and individual travellers. ITS can aid policy delivery and traffic management via a wide range of relatively mature ITS applications such as intelligent traffic signal control, satellite tracking of vehicles, CCTV, variable message signs etc. The latest developments such

as 'cooperative systems' involving vehicle to infrastructure (V2I) communications and vehicle to vehicle communications (V2V) will enable full integration of vehicles in the transport system. The role of ITS in promoting transport safety is also an important aspect of co-operative systems.

The importance of urban logistics within the wider field of traffic management is central. Urban areas are reliant on effective servicing of commercial premises and enterprises for their continuing economic viability. Often there can be potential conflict between initiatives to aid logistics and those to support other policy goals such as environmental zones. ITS have a role to play in co-ordinating and reconciling these apparent conflicts.

There are a number of stakeholders considered as key players for successful formulation of traffic management and urban logistics policies and resulting schemes. The Guidelines highlight those agencies which can act as data providers and how data can be most beneficially used to advance ITS schemes. Reference is also made to the desirability for co-operative partnerships, including joint private- public initiatives to further successful implementation.

Within a matrix of mobility policy-making, ITS impacts directly and adds value across each levels– policy, tactics, measures and operations.

The key factors for successful ITS deployment are co-operation, partnership and interoperability. Other issues that needs to be addressed include productive project management; organisational issues that need to be addressed; how ITS can be used to provide good quality and targeted information to individual travellers, which, in turn can help to optimise network performance; balancing automated processes with human intervention; and the role of standards and harmonisation.

The recommendations for success are the following:

- The need for effective multi agency co-operation is critical in devising an ITS traffic management project. Any organisation wishing to establish a project should seek the active and productive participation of all relevant organisations, as often ITS projects can be complex and costly to procure and implement in isolation. Political problems associated with policy formulation and project implementation are often more challenging than technical problems.
- Identify, define and allocate those management and project related tasks that are essential to the process of delivering a successful project.
- The most successful ITS traffic management policies, projects and systems are those that are focused on delivering relevant services and information to individual end users. Try to structure projects and channel resources that are bespoke to individual end users. In this way operation of the urban road network will also be optimised.
- The effectiveness of ITS in urban traffic management and logistics can generally be increased by adoption of automated systems which are better equipped than humans to perform basic operational functions. Transport authorities are encouraged to try to identify and select those systems which maximise the potential for automated ITS systems to take on functions such as routine data processing and interpretation, which will allow human participation to be focused at the more strategic level.
- Usage of standards can only be beneficial when implementing ITS traffic management projects. Standards are most productively used when they are not onerous but lead to the creation of features such as open platforms for IT technology, which are central to the successful development and future adoption of ITS based

traffic management projects. The challenge is to balance the benefits that can be derived from application of standards without those standards being unduly proscriptive and stifling the creativity that ITS solutions can offer.