Urban Mobility Research Roadmap

ERRAC-ROADMAP WP03: (SUB)URBAN TRANSPORT
(including modal shift, suburban and regional rail, light rail and metro, and sustainable urban mobility)

SUB-WP03 – URBAN MOBILITY

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INTRODUCTION

This research action is supporting the works of the ***European Rail Research Advisory Council (ERRAC)*** set up in 2001. ERRAC is an advisory body to the EU Commission representing Member States and all stakeholders in the sector ranging from operators and infrastructure managers, to manufacturers, freight customers, passengers and academics. Its mission is to develop recommendations regarding European research impacting the rail sector across the EU and beyond.

The ERRAC-ROADMAP CSA addresses the five 'activities' reflecting the strategic and policy challenges facing Europe, as defined by the Commission for the FP7 Transport Work Program sub-theme "Sustainable Surface Transport":

WP01 The **greening** of surface transport,
WP02 Encouraging modal shift and **decongesting** transport corridors,
WP03 Ensuring **sustainable urban transport**,
WP04 Improving **safety and security**,
WP05 **Strengthening competitiveness**

Work package 03 is led by UITP, representing several categories of stakeholders and mainly European local public transport operators (see www.uitp.org). Ansaldo STS supports UITP in its coordination work on behalf of UNIFE representing all the major manufacturers in the European R&D.

Work Package 03 covers two sub-Work Packages:

- **WP03-RAIL**, which includes on the one hand suburban and regional rail systems and on the other urban rail systems like tramway, light rail and metro;
- **WP03-URBAN MOBILITY**, which targets modal shift and sustainable urban mobility

This deliverable addresses the final sub-WP03-URBAN MOBILITY Roadmap. It is the third update of the WP03-URBAN MOBILITY Roadmap which was published first in June 2010 and second in May 2011.

The sub-Work Package WP03-URBAN MOBILITY has a unique feature within ERRAC Roadmap organisation: it is not only part of ERRAC ROADMAP research action, but it is also liaised with the Coordinated and Support Action ERTRAC SAFIER awarded to the European Technology Platform for road, ERTRAC (European Road Transport Research Advisory Council).

The ERTRAC CSA called ERTRAC SAFIER is in charge of producing recommendations for research in five domains:

- Long distance freight transport
- Road transport safety
- Urban mobility
- Energy resources and climate change
- Global competitiveness

The Work Package on "Urban mobility" of ERTRAC SAFIER is led by POLIS, a network of European cities and regions from across Europe. POLIS promotes, supports and advocates innovation in local transport, see: http://www.polis-online.org/
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ERRAC ROADMAP WP03-URBAN MOBILITY led by UITP and ERTRAC SAFIER WG "Urban Mobility" led by POLIS have to coordinate their propositions for EU research actions not dedicated to a given rail or road mode, but covering multimodal and co-modal proposals (further explanation is provided in chapter II).

CHAPTER I: PRESENT SITUATION

1. Overview of the present situation

Efficient urban, suburban and regional transport systems are critical elements of the sustainable development of urban areas, where already some 80% of Europe's citizens live.

Urban public transport and especially rail systems have numerous advantages, which shall never be shared by private car transport in terms of e.g. speed, capacity, safety, environmental friendliness, energy savings and urban space consumption. At the same time, car ownership and car use is increasing every day due to a great variety of attractive technical innovations which are easy to standardise and to implement on private vehicles and on roads or streets in comparison to rail systems. Public transport systems and especially integrated urban public transport systems are indeed far more complex technically than road systems and they involve for their management many more (public) stakeholders than private or commercial vehicles traffic management. In addition, local public transport services are operated under public transport contracts following public service requirements, which represent a heavy financial burden on local authorities as long as negative external costs of motorised road vehicle are not internalised. As a consequence urban public transport will not be able to compete with private cars without an important improvement of public transport attractiveness, and a reduction in investment and operating costs.

This implies an important investment in urban rail, urban mobility and urban public transport research, a strong support from public authorities, and an agreement between local/regional/national public authorities, public transport operators (including railway undertakings and infrastructure managers), and public transport systems manufacturers to coordinate across Europe for technical harmonisation of products and services where it allows to bring European added value. This is the major challenge of WP03. At the same time, the European rail and bus manufacturing industry is a world leader for urban public transport systems (bus, metro, tramway and Light Rail) and has achieved significant innovation for the benefit of the customer (e.g. low-floor bus and low-floor tram), but has to remain competitive for most promising markets in Europe and outside Europe, especially in China and other Asian markets.

In this perspective, the goal of WP03 is twofold. The current deliverable presents only the urban mobility part. The other is described in the Deliverable **WP03-RAIL.**

2. Policy drives and constraints

2.1. Challenges to face for Urban Mobility stakeholders

The challenge for Urban Mobility stakeholders is to develop new mobility schemes which rationalise the use of private cars and commercial vehicles, to promote public transport and – for shortest trips – walking and bicycle, and to conceive and promote innovative non-polluting urban vehicles, new land use patterns and new mobility services for the benefit of all categories of European citizens, with or without access to the car.

2.2. Recent European Commission Communications

The European Union has been paying more and more attention to urban mobility in the recent years, and has adopted two sets of action plans able to support a sustainable urban mobility:

- an **Action Plan on Intelligent Transport Systems** (ITS) (COM (2008) 886) which foresees the set-up of a specific ITS collaboration platform between Member States and regional/local governments to promote ITS initiatives in the area of urban mobility (Action 6.4)
- an **Action Plan on Urban Mobility** (COM (2009) 490) which offers assistance on ITS applications for urban mobility, possibly in the form of a guidance document, to complement the ITS Action Plan (Action 20).

The EC- European Commission (DG MOVE and DG RTD) - has initiated in the second half of 2010 a platform (working group) of cities and their partners to promote the deployment of ITS in urban areas. This platform is exchanging best practice and should develop some kind of guidance. In addition, in the context of the ITS Action Plan, the EC has launched in December 2011 a study on ITS liability issues. Within this study, a survey is currently underway in order to notably collect information about stakeholders' experiences and assessment of possible future developments.

In June 2009, the EC has adopted in a communication COM(2009) 279 (final) "A sustainable future for transport: towards integrated, technology led and user-friendly system" on which every European representative association has taken a position.

The EC organised on 20th November 2009 a conference of a "Sustainable Future of Transport" with UITP participation.

On 28th March 2011, the EC published the new White Paper on Transport COM(2011) 144 final "*Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system*".

On November 30th, 2011, the EC adopted a set of five proposals for the post-2013 Union Research Budget:

- A communication COM(2011) 808 Final "**Horizon 2020 - The Framework Program for Research and Innovation**"
- A proposal COM(2011) 809 Final for a regulation establishing "Horizon 2020 – the Framework Program for Research and Innovation (2014-2020)" which lays down the general objectives, rationale and Union added value, the financial envelope and provisions on control, monitoring and evaluation;
- A proposal COM(2011) 810 Final for a regulation laying down the rules for the participation and dissemination in "Horizon 2020 – The Framework Program for Research and Innovation (2014-2020)" including the modes of funding and reimbursement of costs, conditions for participation, selection and award criteria and the rules on ownership, exploitation and dissemination of results;
- A proposal COM(2011) 811 Final for a Council Decision establishing the Specific Program implementing "Horizon 2020 – The Framework Program for Research and Innovation (2014-2020)" laying down the implementation modalities and the content in terms of the broad lines of activities;
- A separate proposal COM(2011) 812 Final for the part of Horizon 2020 corresponding to the Euratom Treaty.

The White Paper on Transport "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system" is directly influencing the recommendations of the report as well as the content of the last FP7 SST calls and of the next European Research Framework Programme.

Within this policy context, the set of proposals "**Horizon 2020 - The Framework Program for Research and Innovation**" focuses resources on three key priorities, all of which are relevant for Urban Mobility:

- **Excellent Science**
- **Industrial Leadership**
- **Societal Challenges**

Four of the societal challenges are particularly relevant for Urban Mobility:

- **Secure, clean and efficient energy;**
- **Smart, green and integrated transport;**
- Climate action, resource efficiency and raw materials;
- **Inclusive, innovative and secure societies.**

CHAPTER II: STATE OF THE ART, RECENT PROJECTS AND ON GOING RESEARCH REGARDING URBAN MOBILITY

1. EU R&D and urban mobility: a complex issue in which UITP has been involved for long in cooperation with EC

Many European research projects dealing with urban mobility have been performed in the last 15 years. None of them was directly a result of ERRAC proposals, but from the start of ERRAC, Intelligent Mobility – which covered as well urban mobility - has always been recognised as one of the most important priorities for the rail sector.

UITP has been for years at the front line regarding urban mobility, in partnership with other European associations like POLIS, ECTRI, EMTA…, which is logical because by essence – contrary to ERRAC – UITP is dealing with all public transport modes and is directly focusing only on urban, suburban and suburban public transport. UITP, which is the – worldwide - forum of local public transport stakeholders, has many commissions addressing urban mobility related issues. Those UITP thematic commissions (e.g. transport and urban life, marketing) are presented at:
http://www.uitp.org/about/Working_bodies.cfm

EU research is one of the three pillars for a more competitive European industry which are:

- European legislation,
- Standardisation and technical harmonisation,
- European Research.

UITP has developed a wide range of actions in these three domains when urban mobility was at stake, and maintained strong contacts with several European Commission Directorates, and especially DG TREN (now DG MOVE), DG RTD, DG INFSO and DG ENTR.

UITP is a member of ERRAC since its creation in 2001 and a member of ERTRAC since 2007.

Several projects dealing in a way or another with urban mobility have involved UITP as a partner or as a coordinator in the last 10 years, e.g. for UITP as a coordinator, as follows:

- With DG TREN, VOYAGER (2001-2004) and **SPUTNIC (July 2006-July 2009)** (and as a partner, ***momo*** Car-sharing, a European project supported by IEEE – Intelligent Energy Europe)
- With DG RTD, **EURFORUM (April 2007-December 2008)** and **EBSF (September 2008-September 2012)**, European Bus System of the Future, part of which addresses multimodal ITS

- With DG INFSO, TR@nsITS (2002-2004) and **IFM-Project (February 2008-June 2010)**.
- With DG ENTR, **COUNTERACT**.

Every one of these projects has produced its own State of the Art of R&D projects, which are very numerous.

The most important projects in relation with WP03-Urban Mobility are **EURFORUM** and **ERTRAC SAFIER**. Both were mandatory references from ERRAC ROADMAP Description of Works and are described hereinafter. Other above projects in bold characters are presented in Annex 2.

2. EURFORUM

EURFORUM has been a €400 000 Coordination Action (EC grant: 100%) coordinated by UITP, which has been undertaken in partnership with ECTRI, TU Dresden, POLIS, CERTU, ASSTRA and EMTA from April 2007 to December 2008. EURFORUM's objective was a better and more innovative coordination of research serving urban mobility of persons and goods. The term "urban mobility" was covering as well transport between an agglomeration and its hinterland.

EURFORUM covered road-, rail-, and waterborne transport, and focused both on technology-oriented and on policy-oriented research. The project paid special attention to urban mobility challenges in the New Member States.

The overall objective of EURFORUM was to better structure and better coordinates European research on urban mobility for passengers and goods, by involving all relevant stakeholders in the preparation of a European Strategic Research Agenda for Urban Mobility.

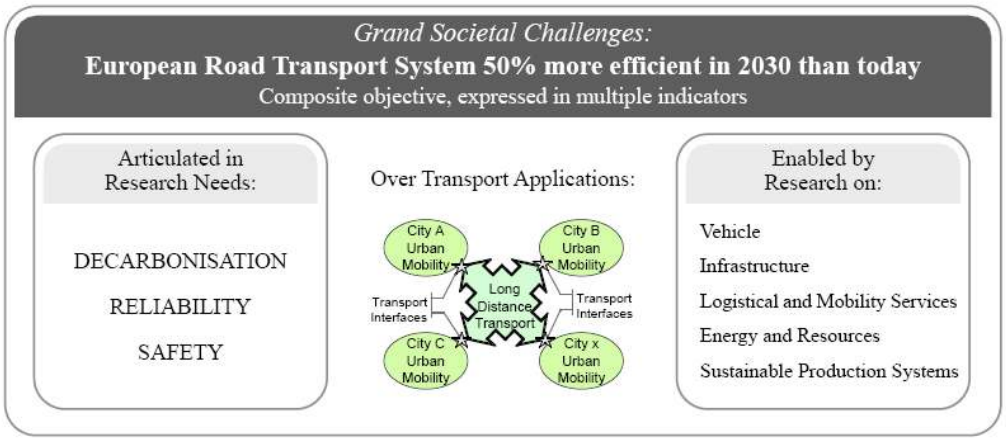
EURFORUM SRA serves as a reference for the design of the roadmap for urban mobility, together with the recommendations produced by the thematic Working Group of ERTRAC on Urban Mobility.

3. ERTRAC SAFIER

ERRAC WP03 has to coordinate with ERTRAC SAFIER in order to achieve a common understanding of the targets to be set up for urban mobility.

ERTRAC Working Groups (with a participation of ERRAC members) have undergone in 2008 and 2009 a thorough analysis of "Key factors" influencing the road market and urban mobility, which have been extensively used to draw the "ERTRAC Transport scenarios 2030+" which are presented in Annex 1 for the "Urban Mobility" part of the document.

ERTRAC SAFIER has updated the ERTRAC SRA. The general frame for this new ERTRAC SRA is summarised in the following diagram:



The long term vision for 2030 and the overall targets for research of ERTRAC have been discussed between ERRAC and ERTRAC at different levels all along 2009 and 2010, including the participation of ERRAC ROADMAP WP03 members in ERTRAC Urban Mobility WG meetings.

The ERTRAC vision 2030, called "ERTRAC Transport Scenario 2030+" can be downloaded at:
http://www.ertrac.org/?m=7

4. EU R&D and urban mobility: recent projects

In addition to the projects involving UITP, many others have been recently undertaken. One can mention all the CIVITAS projects, which provide a very useful set of benchmarks for medium size cities[1] (see: http://www.civitas-initiative.org/main.phtml?lan=en), and BESTUFS for what relates to City Logistics Solutions for freight (see: http://www.bestufs.net/results.html).

With regards to ticketing, the IFM-Project has produced recommendations which make interoperable ticketing possible across Europe. These recommendations are disseminated and discussed in a Forum (IFM-Forum) set up by UITP some years ago. They include a proposal for a pilot test which requires a financial support from the European Commission.

With regard to ITS – Intelligent Transport Systems - and passenger information systems many recent projects have produced interesting recommendations, e.g.:

- **LINK** (April 2007-April 2010), the European forum of intermodal passenger, see: http://www.linkforum.eu/
- **EMOTION** (May 2006-July 2008), on the investigation, definition and recommendation of Pan-European solutions for the provision of multi-modal, pre-

[1] The CIVITAS Initiative helps cities to achieve a more sustainable, clean and energy efficient urban transport system by implementing and evaluating an ambitious, integrated set of technology and policy based measures.

and on-trip Traffic and Travel Information Services based on widely adopted and emerging sector standards, see: http://www.emotion-project.eu/

- **EASYWAY**, a Europe-Wide project for the deployment of ITS on the Trans European Road Network targeting co-modal traveller information services. The EasyWay programme activities stretch over a seven-year period, from 2007 until 2013, but set the targets for 2020 similar to the White Paper, see: http://www.easyway-its.eu

One project coordinated by POLIS is dedicated to accessibility of public transport. The web site, http://niches-transport.org/site/ , leads to another one, APTIE (for Accessible Public Transport in Europe: http://www.aptie.eu/site/index.php?id=23) which is presented as a one-stop shop for matters related to accessibility in public transport.

Some of these projects are presented shortly in Annex 2. Additional information can be found on **ELTIS website**, "Europe's number one web portal on urban transport and mobility" (on a total of 1827 case studies as of mid-March 2012). See: http://www.eltis.org/Vorlage.phtml?sprache=en

The Eltis portal is financed by the Commission under the Intelligent Energy- Europe programme and managed by the Executive Agency for Competitiveness and Innovation (EACI). The EACI has contracted a consortium led by Austrian Mobility Research to operate and promote the Eltis portal (http://ec.europa.eu/eaci/)

The ELTIS case studies are classified into 10 local transport concepts:

Walking
Cycling
Clean and energy-efficient vehicles
Collective passenger transport
Urban freight/city logistics
People with reduced mobility
Intermodality
Mobility management
Traffic and demand management
Transport planning and land use

In addition to EU R&D projects, some ITS multi-regional or multi-national tools can also be regarded as useful references, like:

- **JourneyWeb**, an XML protocol to allow distributed journey planning engines to communicate in order to provide multimodal journeys spanning different regions. The protocol is a UK national de facto standard sponsored by the UK Department of Transport and is being used in the Transport Direct Portal project to provide contiguous distributed journey planning for the whole of the UK. See: http://www.dft.gov.uk/journeyweb/
- **EU-SPIRIT**, a European cross-border and Internet-based travel information system offering the calculation of door to door travel itineraries between European

cities for customers of public transport. It is based on existing local, regional, and national travel information systems which are interlinked via technical interfaces (like DELFI for Germany launched in 1996 by the German Ministry of transport in co-operation with the Länder (regions), see http://www.delfi.de/). Up to now, providers from six different EU countries offer the EU-Spirit service, namely Denmark, Germany, Luxembourg, Sweden, Poland and France, see: http://www.eu-spirit.com

The main obstacle towards the improvement of the internal market faced by such projects is that the market uptake is generally limited to the local or national level, with no coordinated EU implementation based on European harmonised guidelines or standards or any other common practice.

This is due to several reasons, among which:

- the lack of strategic vision from actual stakeholders giving main or exclusive attention to short term actions on their local territory (be it urban, regional or national). However, most often their business case is more than 95% local, and their mandate or contract very limited in time (usually less than 10 years).
- the weak participation of real decision makers in EU R&D projects, leaving room for consultants and academics not aware of the real market constraints
- the huge fragmentation of responsibilities influencing urban mobility in a given metropolitan area
- the lack of European approach of urban mobility problems by local stakeholders
- the lack of tools at the European level to ease such a European approach of urban mobility problems
- the current distortion of EU R&D programmes in favour of an urban mobility based on private car use
- the lack of cooperation between decision makers for developing and implementing innovative products or services: due to the huge competition on both the manufacturing side and the service supply side between the major market actors, innovation is regarded as an in-house concern even when targeting services operated under public service requirements
- the extreme variety of cultures and languages across Europe in comparison with other large regional markets (USA, Latin America, Arab world, India, China…) where one language can be used for a given market.
- the fragmentation of the public transport services, which makes a "seamless transport" approach much more challenging for collective transport than for private car use even in a small area, and increases the difficulty with the size of the territory taken into account for a door-to-door travel strategy.

5. EU R&D and urban mobility: SECUR-ED

Security in Mass transportation has become a major concern at European level after several terrorist attacks against metro and suburban rail systems along the last ten years. Several Directorate Generals of the European Commission have therefore - among other initiatives – awarded studies and research actions for mitigating the risks

associated with terrorist attacks. UITP has been a coordinator of such a project, COUNTERACT, already mentioned above and presented in Annex 2.

Awarded under the Security call launched in 2009 by DG ENTR (FP7-SEC-2010.2.1-1) on "Security of mass transportation - Phase II", the project SECUR-ED (*Secured Urban Transportation - European Demonstration*) started on 1st April 2011. The consortium coordinated by THALES is made of major manufacturers, operators and local authorities in charge of public transport. The project's duration is 42 months, with a total budget of M€45 and an EC grant of M€25.4. It should provide transport operators of large and medium cities of Europe the means to enhance urban transport security.

Societal and legacy concerns dictate a very diverse environment of mass transportation across Europe. To overcome it and deploy a consistent set of solutions, SECUR-ED concentrates on aggregating a consistent and interoperable mix of technologies and processes, understanding best practices, starting from risk assessment and ending with complete training packages.

SECUR-ED is organised with sub-projects implementing coherent steps towards the goal of a global European approach of Mass transportation security, among which:

- Addressing the challenge of mass transportation operators' adaptive security organisation, the (SP2) subproject delivers system-of-systems architecture definition and interoperability language, as well as a description of tools and guidelines for modelling and simulation of specific threats situations.
- The adequate capacities (made up of best practices, procedures, training and hardware and software technical modules) are selected and packaged in the (SP3) sub-project. It includes:
    - Development of emergency procedures and applied handbooks for the purpose of managing risks and planning the operations. It includes also tools to ensure fast restoration of activities, and training modules for various stakeholders allowing coordinated responses.
    - Video analytics to analyze threats, to identify people and to anticipate dangerous events, using spatial/pattern recognition techniques: detection, tracking and tracing individuals or objects.
    - Standardized information management and communication systems addressing the overall exchange of information between the different public transport actors and the users.
    - Protection, hardening and resilience of existing and new critical infrastructures.
    - Intelligent incident prevention and early warning systems using multiple sources correlation CBRN-E sensor systems to be used prior, during and after a critical event.
- Within four cities (Madrid, Paris, Milan and Berlin), the (SP4) sub-project integrates, validates, and demonstrates the interoperability of those capacities. Based upon a seamless integration process, this will exhibit the showcase of this unique European initiative with its major output: a global validated security enhancement package, including risk assessment tools.

- The (SP5) phase asserts the effectiveness of the global security package. A set of medium to large size cities ("Satellite demonstrators") will use it to assess their risks and design their own solutions, simultaneously addressing staff (through training and best practices learning) and technical enhancements.

In order to ensure improved, effective and operable security in Mass Transportation, starting from a consensual understanding of the project results, Operators, First responders and Authorities' Advisory Groups are committed to an active dissemination process around urban transport stakeholders associations and security organisation.

The SECUR-ED partners are: DEUTSCHE BAHN, Germany; THALES, France; FOI, Sweden; RATP Paris, France; BOMBARDIER, Germany; FRAUNHOFER, Germany; SNCF, France; ANSALDO, Italy; TNO, Netherlands; ATM Milan, Italy; ALSTOM, France; JRC, Italy; FNM Milano, Italy; AXIS, Sweden; VTT, Finland; CRTM, Spain; INECO, Spain; CEA, France; EMT Madrid, Spain; NICE, Israel; WUERZBURG University, Germany; London Underground, UK; EDISOFT, Portugal; STAVENGER University, Norway; TCDD, Turkey; SAGEM, France; TU DRESDEN, Germany; STIB-MIVB, Belgium; INOV, Portugal; PADERBORN University, Germany; EMEF, Portugal; HAMBURG CONSULT, Germany; STSI, France; MTRS3, Israel; UITP, Belgium; GTEAM, Israel; ICCA, Spain; UNIFE, Belgium; EOS, Belgium; CTM, Madrid;

6. Recent proposals EU R&D projects addressing Urban Mobility

The partners of WP03-Urban Mobility Roadmap have been associated to the works of the various research support actions of ERRAC since the creation of the ERRAC European Technology Platform. They have **contributed each year to the identification of research actions** to be proposed to DG RTD for the next call. Many projects above mentioned are part of these research actions.

In December 2011, several WP03 partners submitted under SST call 2012 ("call 5") of Summer 2011 two proposals - under Activity 7.2.3. Ensuring sustainable urban mobility - in which UITP is the coordinator:

- "**NODES**" - New tools for Design and Operation of Urban Transport Interchanges - is targeting Area 7.2.3.1. New transport and mobility concepts and addressing the topic SST.2012.3.1-2. Innovative design and operation of new or upgraded efficient urban transport interchanges (CP-FP, max 3)
- "**3IBS**" – Innovative Integrated Intelligent Bus Systems – is targeting Area 7.2.3.2. High quality public transport and addressing the topic SST.2012.3.2-1. Coordinating innovation for efficient bus systems in the urban environment (CSA-CA, max 3)

CHAPTER III: VISION

ERRAC Roadmap on Urban Mobility has to consolidate visions from several major projects and from the European Commission:

- ERRAC SRRA 2020
- EURFORUM vision 2020
- Insights from the new White Paper on Competitive and Sustainable Transport

1. ERRAC SRRA 2020

ERRAC has developed a vision 2020 for the European Rail transport system leading to the Strategic Rail Research Agenda (SRRA 2020) first published in 2002 and updated in 2007. ***The SRRA 2020 of 2007 is a basic reference document for the current ERRAC-ROADMAP research action. It is presented on ERRAC website*** *(www.errac.org).*

ERRAC SRRA set out a Railway Business Scenario based on:

- **Rail doubling its share of both the freight and passenger markets by 2020, and**
- **Rail tripling its freight and passenger market volumes in 2020 as compared with 2000.**

It has to be noted that the ERRAC vision has been in June 2009 enlarged by UITP to all public transport modes, when UITP set out an ambitious aim to double the market share of public transport worldwide by 2025. This ambition goes by the name of '**PTx2'** and applies for urban mobility structural changes. Whilst this aim is undoubtedly bold, it is not unrealistic: many cities have already taken up the challenge and are working towards this goal, in line with their specific political, geographical and historical contexts. More information can be found at: http://www.ptx2uitp.org/

2. EURFORUM VISION 2020

EURFORUM project produced a vision for 2020 which had to be used as a reference for WP03-Urban Mobility Roadmap. This vision is as follows:

	EURFORUM's Vision of Urban Mobility in the year 2020: What should Urban Mobility look like?

According to this Vision, the following principles apply to urban mobility in 2020:

- European cities and towns are easily and equally accessible for people and goods. A well-organised urban transport supports the reduction of social and spatial segregation.
- Urban transport has developed into a more sustainable, effective and user-oriented system of integrated services and infrastructures, thus contributing significantly to the liveability and wealth of cities and ensuring freedom of movement. The urban transport system enables and eases co-modal travel.
- In 2020 urban policies have been more effectively linked with each other. There is a much stronger participation of all citizens, users, decision-makers and planners in the development and endorsement process of urban policies.
- A major contribution is made by the coordination of land use and town development planning with transport planning and mobility management. In many cities, plans are updated on a regular basis, at least every five years. Sustainable urban transport plans are mandatory in cities with more than 100,000 inhabitants.
- Cities and towns have understood and accepted their key role in the field of city logistics. City logistics have been better linked to urban policies, and the coordination of actors and interoperability of the infrastructures enable a more efficient and sustainable urban freight transport.
- Europe's towns and cities are the liveable homes of most Europeans and form vibrant centres of cultural and social interaction. At the same time they act as the motors of prosperity in an increasingly global economy, concentrating both knowledge and technical capacity.
- In order to play this role successfully, towns and cities form the focus points of transport networks for persons and goods, on different scale levels and using different modalities. Urban mobility policies and transport systems are defined specifically bearing in mind the urban citizens' needs and expectations, whatever their age, physical ability and social condition.
- Thanks to technical progress and changes in the regulatory framework, the future urban areas are able to cope with the negative impacts of their own success: congestion, urban sprawl, pollution, road accidents, economic and social exclusion.
- Successful developments and applications of new transport technologies in European cities and towns have made Europe the major global player in the field of sustainable transport technologies.
- Transport safety issues have been integrated into urban transport policies at a high level as well.
- Although the alternatives to traditional fossil fuels still have low market shares, traffic related air polluting emissions (including greenhouse gases) have decreased significantly thanks to a combination of different factors: e.g. a higher modal share of public transport, cycling and walking; a higher use of shared private transport; increased fuel efficiency of vehicles and less congestion. Local air pollution in particular has decreased dramatically thanks to ever more demanding emission standards for both public and private transport.
- Innovative concepts and technologies have helped to curb noise pollution caused by urban transport.

- Among the population and decision makers there is a widespread acceptance of transport demand management strategies ensuring a more efficient use of existing infrastructure.
- The internalisation of all external costs into all modes of transport has facilitated a fair pricing system for mobility and enables a well-informed population to more efficiently use the urban transport system.
- The role of user-financed systems through road pricing and other integrated pricing strategies as a means for demand management has become more and more important inside and outside of cities. It ensures reliable financing of transport infrastructure and maintenance. The role of public transport, shared private transport and soft modes to reduce congestion is considered appropriately by being partially cross-financed through road charging.
- There is a continuous monitoring of land use and mobility patterns, of regulatory frameworks and practices, and of environmental and economic performance on the basis of agreed common indicators and measurable targets at the European level. Benchmarking with other cities and towns has been institutionalised.
- The regulatory framework for public transport enables competition in cities that wish to open up their services. Local authorities retain the freedom to choose the solution that best suits their capabilities and local needs. This framework provides incentives for operators to optimise their technical efficiency, and gives room for innovative entrepreneurship while protecting the interests of consumers. It allows financial transfers from the public budget to compensate for public service requirements.

3. Insights from the new White Paper on Competitive and Sustainable Transport

The White Paper on Transport COM (2011) 144 final, **"Roadmap to a Single European Transport Area – White Paper on Competitive and Sustainable Transport"** is of primary importance for the ERRAC Roadmap, as it sets up a vision for 2050, aiming at an integrated, sustainable and efficient mobility network covering all transport modes by air, road and waterborne. It describes a strategy to steer change based on the following (presenting only the land transport components):

- an efficient and integrated mobility system (taking into account land transport security and safety and travel services quality and reliability);
- a European transport research and innovation policy covering an integrated urban mobility with a new approach of urban transport governance, urban pricing and access rules as well as urban logistics;
- modern infrastructure and smart funding for an improved territorial cohesion and economic growth exploiting the strengths of each individual modes and supporting the implementation of an integrated European transport network benefitting from a coherent funding framework, while pricing policies would better reflect the economic costs and avoid competition distortions between modes;

- giving particular attention to the "external dimension" of transport, in order to achieve global objectives through reinforced dialogue and intensified cooperation.

It would be inappropriate to extract from the White Paper all the references potentially involving Urban Mobility. However, some of them which are particularly relevant for this sector are quoted below:

(Clause 2.2.) An efficient core network for multimodal intercity travel and transport

(22). In the intermediate distances, […]. More resource-efficient vehicles and cleaner fuels are unlikely to achieve on their own the necessary cuts in emissions and they would not solve the problem of congestion. They need to be accompanied by the consolidation of large volumes for transfers over long distances. This implies greater use of buses and coaches, rail and air transport for passengers and, for freight, multimodal solutions relying on waterborne and rail modes for long-hauls.

(23). Better modal choices will result from greater integration of the modal networks: airports, ports, railway, metro and bus stations, should increasingly be linked and transformed into multimodal connection platforms for passengers. Online information and electronic booking and payment systems integrating all means of transport should facilitate multimodal travel. An appropriate set of passengers' rights has to accompany the wider use of collective modes.

(Clause 2.4.) Clean urban transport and commuting

(31). A higher share of travel by collective transport, combined with minimum service obligations, will allow increasing the density and frequency of service, thereby generating a virtuous circle for public transport modes. Demand management and land-use planning can lower traffic volumes. Facilitating walking and cycling should become an integral part of urban mobility and infrastructure design.

(32). […]. Road pricing and the removal of distortions in taxation can also assist in encouraging the use of public transport and the gradual introduction of alternative propulsion.

(33). The interface between long distance and last-mile freight transport should be organised more efficiently. The aim is to limit individual deliveries, the most 'inefficient' part of the journey, to the shortest possible route. The use of Intelligent Transport Systems contributes to real-time traffic management, reducing delivery times and congestion for last mile distribution. […]

(Clause 2.5.) Ten Goals for a competitive and resource efficient transport system: benchmarks for achieving the 60% GHG emission reduction target

Developing and deploying new and sustainable fuels and propulsion systems

(1) Halve the use of 'conventionally-fuelled' cars in urban transport by 2030; phase them out in cities by 2050; achieve essentially CO_2-free city logistics in major urban centers by 2030[2].

Increasing the efficiency of transport and of infrastructure use with information systems and market-based incentives

(8) By 2020, establish the framework for a European multimodal transport information, management and payment system.

(9) By 2050, move close to zero fatalities in road transport. In line with this goal, the EU aims at halving road casualties by 2020. Make sure that the EU is a world leader in safety and security of transport in all modes of transport.

(10) Move towards full application of "user pays" and "polluter pays" principles and private sector engagement to eliminate distortions, including harmful subsidies, generate revenues and ensure financing for future transport investments.

2 This would also substantially reduce other harmful emissions.

CHAPTER IV: PRIORITY RESEARCH AREAS FOR A SUSTAINABLE URBAN MOBILITY

1. The various inputs to ERRAC Urban Mobility Roadmap

Several inputs have been used to set up the ERRAC Roadmap for Urban Mobility:

- the EURFORUM SRA;
- ***a survey involving major stakeholders through a detailed questionnaire***;
- the analysis of former FP7 calls;
- the outcomes of the works on Urban Mobility of the research action SAFIER of the road Technology Platform ERTRAC;
- the White Paper on Competitive and Sustainable Transport

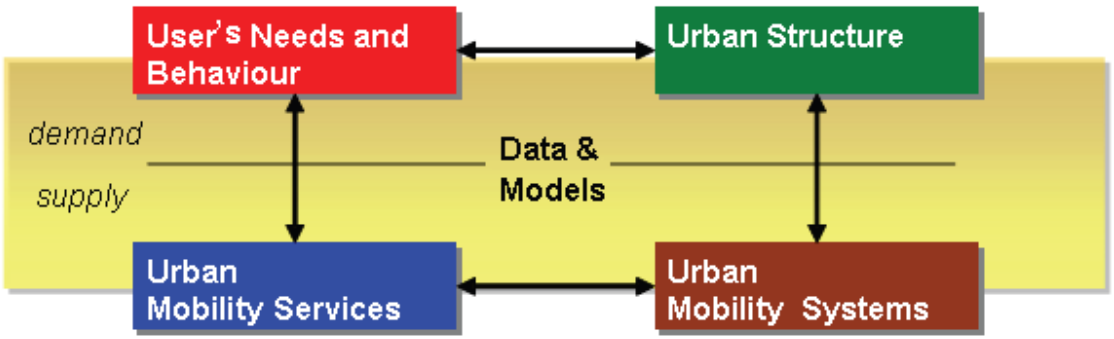
Each of these inputs is summarized hereinafter.

1.1. The input from EURFORUM SRA

The initial priority areas which have been identified for setting up the research roadmap on urban mobility are those selected in the EURFORUM SRA:

1. **User Needs and Behaviour**
2. **Urban Structure**
3. **Mobility Services**
4. **Integrated Systems**
5. **Urban Transport Demand Analysis and Modelling for Policy Support**

The following diagram shows the relationship between these topics:



Based on research topics proposed in the EURFORUM SRA, and on other documents prepared by UITP (UITP SRA), a questionnaire – presented in Annex 3 - has been

issued[3] to specify the level of priority of each identified research action – a level on a scale 1 to 5; 1 being the highest priority and 5 a low priority -. The questionnaire précised as well the possible involvement of the responder in case a research action would be selected (L-Leader, P-Partner, U-Member of a "users' group", or no involvement). The questionnaire has been largely disseminated in UITP and UNIFE membership, through e.g. for UITP the European Union Committee, and several UITP Commissions (e.g. Transport and urban life, Marketing, Academic network…). It has also been sent to the former partners and associated persons involved in the EURFORUM project.

1.2. The input from stakeholders

As a whole, 27 answers were received from the following organisations:

- Industries
  - CAF
  - Thales Transportation Systems Division
  - Bombardier Sweden
  - Faiveley Transport
  - Ansaldo STS

- Operators
  - De Lijn
  - Stuttgarter Straβenbahnen AG
  - ASSTRA
  - RATP
  - Horarios do Funchal, Transportes Publicos, S.A.
  - ATM
  - Transports Metropolitans de Barcelona
  - UITP Transport and Urban Life Commission

- Organising Authorities
  - Centro
  - Nexus
  - Verkehrsverbund Ost-Region GmbH
  - TfL
  - MVV
  - OASA, Athens
  - Provincie Gelderland
  - HVV

- Consultants & Research Institutes
  - Flanders Institute for Mobility
  - IFSTTAR-Leost & IFSTTAR-Estas
  - DLR Institute of Transport Research

[3] Another questionnaire has been produced for WP03-Rail Roadmap.

- DLR
- International Air Rail Organisation
- WSP Analysis & Strategy, Sweden

Based on the results of this consultation, EXCEL files – presented in Annex 4 - have been produced, which include the detailed answers as well as an analysis of the results for each research topic by:

- calculating the average priority from all responses, as well as the number of answers per category of stakeholders (manufacturers, operators, organizing authorities and consultants/academics). Colours have been used to highlight the main priorities:
  - Yellow for average priority lower than 2.5 (medium priority)
  - Green for average priority lower than 2.2 (high priority)
  - Orange for a level of participation with more than 5 Leaders or Partners
- summing up the number of answers on the level of potential participation as leader (L), partner (P) or member of a "users' group" (U).

1.3. The input from the FP7 calls

FP7 calls that have been published since the publication of the EURFORUM SRA have all been checked in order to point out which research topics in the field of Urban Mobility identified in EURFORUM SRA have been considered in the calls. The results of this analysis are presented in Annex 5.

1.4. The input from ERTRAC SAFIER

ERTRAC SAFIER identified four main research topics as follows:

- Integrating urban mobility management
- Interfaces and services for an efficient urban freight delivery system
- The integration of traffic and travel information
- The integration of ticketing and charging services for all mobility related charges in the urban areas

1.5. The input from the White Paper on Competitive and Sustainable Transport

The White Paper on Competitive and Sustainable Transport[4] is proposing a vision for 2050 which has been presented above in Chapter III.

The vision 2050 of the White Paper on Competitive and Sustainable Transport is broader than the EURFORUM vision 2020 - which scope was restricted to Urban Mobility -, but they are fully complementary, and the White Paper acknowledges the growing importance of cities in the overall transport policy.

The White Paper is detailing in its Annex 1 numerous initiatives which shall contribute to the realisation of the "vision 2050". The initiatives and (actions) which are directly impacting urban mobility issues have been extracted from the White Paper Annex and are presented in Annex 7.

2. Recommendations for ERRAC Urban Mobility Roadmap

From all above input analysis, it appears that the major drivers and focus for the development of an Urban Mobility research agenda can be organized in seven major components as follows:

- ***Integrated Urban Mobility Systems and Governance***
- ***Innovative Infrastructure***
- ***Interfaces and Complementarities between Freight and Urban Mobility***
- ***Users Needs and Behaviour***
- ***Innovative technologies, tools and products***
- ***Cooperation between stakeholders***
- ***Data and Models***

All these components have to serve the overall objectives of competitiveness and sustainability of urban transport. This leads to add for all components the following transverse guidelines:

- Support integration ("think system") at every level of planning and analysis (see also point I).
- Develop **customer-oriented** policies and measures ("target client needs of today and tomorrow"). Services to individuals and specific social groups should benefit from an integrated approach of urban mobility problems and solutions, and at the same time should answer the needs of specific market segments through the "customization" of services and technologies is a key driver for many research components, and especially innovation.
- Adopt a European perspective complementing the 'city-centric" view of economic actors at all institutional levels ("**think both local and European**") (see also point VI). The urban mobility integration is a

[4] COM (2011) 144 final, "Roadmap to a Single European Transport Area – White Paper on Competitive and Sustainable Transport"

major stake at the local level, and also at the European level. Most mobility policy decision-makers are located at the local level and have to **cooperate locally** for the benefit of the local citizens and local economy; at the same time, some local solutions could also be used for similar purposes in other cities, and in many cases a **standardisation of solutions** could be useful for all and create new business opportunities, provided that adequate co-operation is set up between cities. Conversely, transport decision-makers at the European level have to develop macro-economic policies involving cities in a global European economy, and should not forget that their decisions should not harm local citizens against the general interest.

2.1. Integrated Urban Mobility Systems and Governance

This major component encompasses all aspects involving mobility stakeholders at the local and European level aiming at improving urban mobility over time in a coordinated way: it covers urban systems design and operations management as well as integrated urban governance over the city and its hinterland.

The objective is to develop research actions allowing for setting up at conurbation level a sustainable urban mobility policy covering short-, medium- and long-term considerations, knowing that there is no one-fits-all solution possible.

Research issues within this component are covering mainly:

- regulations (push-pull measures targeting various societal purposes);
- taxation and pricing/charging/fare policies (push-pull measures targeting various societal purposes and taking into account both the willingness to pay of individual households, of companies and of institutions and the need for an internalization of external costs of urban transport modes);
- information;
- financial and institutional framework;

All these have to be set up for various periods of time:

- in a short term standpoint, topics concerned are e.g. parking policies, traffic management, mobility demand management, new mobility services, actions influencing modal choice and travel behaviour, new activities settlement and transport services;
- in a longer term and with a strategic view, topics are mainly land use, transportation and mobility planning, (re)-distribution of existing and new urban space between activities (dwelling, employment, commerce, culture, green spaces…), concentration of activities (more density) as well as their combination/separation.

With reference to EURFORUM SRA, this component is gathering the following topics (those in bold characters are those which received a high priority from UITP survey):

- **Actively influencing user behaviour (1.6)**
- Making land development more sustainable (2.2)
- **Developing integrated planning (2.4, partial)**
- **Information and payment services for different modes (3.1.1);**
- The impact and opportunity of developing further charging schemes (3.3.6)
- **Developing multimodal interchanges and intermodal policies (4.2.3)**
- **Intelligent integrated transport network management (4.2.4)**
- **Strenghtening the alternatives to private car use (4.4)**

This component encompasses the three following ERTRAC priorities:

- Integrating urban mobility management
- The integration of traffic and travel information
- The integration of ticketing and charging services for all mobility related charges in the urban areas

2.2. Innovative Infrastructure

Infrastructure management and new infrastructure development are crucial for a competitive and sustainable development of cities: an efficient and attractive urban mobility for all social groups fully relies on manageable infrastructure and affordable transport capacity.

At the same time, the creation of new infrastructure is every day more difficult in an urban environment, due in most cases to local opposition against any important project (NIMBY attitude), and to the increasing cost of civil works.

Research topics have to consider issues like:

- Improved management of existing infrastructure (allocation of space between modes and infrastructure design) to make it more efficient, greener, safer and more secure (e.g. bus systems of the future)
- Improved maintenance of existing infrastructure (reduced costs, coordination of maintenance between utility services)
- Social acceptance of new infrastructure procurement and legal issues
- New infrastructure concepts reducing environmental impact and integrating land use aspects, as well as the relationship with transport (mobility?) nodal points (hubs, multi-modal interchange stations…)
- New infrastructure construction methods reducing LCC
- New sustainable funding of infrastructure

With reference to EURFORUM SRA, this component is gathering the following topics (those in bold characters are those which received a high priority from UITP survey):

- **More efficient use of existing transport infrastructure** (2.3)

- **Developing integrated planning (2.4, partial)**
- Sharing infrastructure (4.2.1)
- Funding urban transport (4.2.2)

2.3. Freight and Urban Mobility: Interfaces and complementarities

More and more urban mobility problems are created by the growing motorized travel and parking needs of both passenger and freight vehicles in dense areas, with both transport sectors competing for space and priorities at given time periods (peak and off-peak traffic, night distribution of goods etc.). The logistics problems of the distribution of goods in cities, also increased by e-commerce success stories, have to be tackled through innovative approach of goods delivery per category of goods and potential combination/sharing of freight and passenger services and road and rail modes (and waterborne transport).

With reference to EURFORUM SRA, this component is including the topic "implementation of new urban freight concepts in integrated urban transport systems" (4.3).

It includes as well the ERTRAC priority "Interfaces and services for an efficient urban freight delivery system".

2.4. Users needs and behaviour

Understanding the current needs of citizens and social categories for better serving them in the short term is a real challenge. It is also fundamental to identify the potential evolution of these needs in the future, so as to serve them and possibly influence them for the benefit of all with a view of the general interest.

Regarding user needs and behaviour, key words for research topics are:

- better understanding of customer needs and expectations;
- better understanding of the mobility behaviour of individuals and firms;
- better understanding of social determinants of mobility behaviour;
- better understanding of influences which determine people's and firms' choice of location;
- better measuring customer satisfaction;
- integrating customers as actors of urban mobility management, for the design of new services as well as at operational levels (for adapting services, e.g. in case of degraded situations)
- better knowledge of potential impact of new integrated transport policies, including user acceptance analyses;
- better knowledge of potential impact of new scenarios of urban development (new land use and transport patterns);
- understanding and managing impact of societal changes;

- understanding and managing customers reactions towards global political targets (fighting climate change, environmental protection, safety and security…)
- defining "accessibility" as a tool for measuring mobility services impact and as an objective for improved mobility services;
- all of these requiring better data and better models (see point VII).

With reference to EURFORUM SRA, this component is gathering the following topics (those in bold characters are those which received a high priority from UITP survey):

- **Better understanding of the mobility behaviour of individuals and firms (1.1)**
- **Improving the accessibility and sustainability of our cities (1.2)**
- **Knowing the user: market research (1.3)**
- **Impact of (hard and soft) policy measures and system innovations on mobility behaviour (1.4)**
- **Impact of societal changes on mobility behaviour (1.5)**
- User acceptance analyses (1.7), **including new multimodal transport concepts (1.7.3) and technological solutions (1.7.4)**
- Analysis and assessment of interactions between urban land use and transport (2.1), including a better understanding of influences which determine people's and firms' choice of location (2.1.1)

User behaviour is as such a priority of ERTRAC Roadmap.

2.5. Innovative technologies, tools and products

Innovation can be brought in all assets of transport systems, as well as in all operations practices. However, the most promising research area for improved sustainable mobility services is the innovation in ITS services.

It is very difficult to plan the content and impact of potential future innovations in the very quickly changing world of New Information and Communication Technologies (NICT). It is a very competitive area where innovations become obsolete faster than ever before. A specific research action could even focus on predictive crystal balls!

However, NICT have proved to offer entirely new opportunities (e.g. Internet based services, GPS based services) which became in a few years time an integral part of the daily life of individuals, companies and institutions in all their activities.
Innovative intelligent technologies, tools and products can serve numerous sustainable and competitive urban mobility objectives:

- create new opportunities for customized services (e.g. on demand services);

- offer new mobility management possibilities thanks to social networks (exchange of information on a real-time basis allowing for real-time improvement of transport services management);
- tackle the needs of a large variety of social groups (e.g. students, active population, retired people, old persons, PRMs…).

However, research on ITS developments has also to consider drawbacks like the protection of privacy and of individual rights and the social acceptance by specific social groups of new devices and software.

With reference to EURFORUM SRA, the component "Innovative technologies, tools and products" is gathering the following topics (those in bold characters are those which received a high priority from UITP survey):

- **Towards seamless multimodal transport** (3.1), including:
    - **Positioning systems for cyclists and pedestrians (3.1.2);**
    - Compilation and dissemination of good practices for demand responsive transport schemes to supplement transport services either for targeted groups or in non dense areas (3.1.3);
    - Quiet night delivery, IT and communication systems for trip planning and customer information (3.1.4);

- **Technical issues** (3.5), including:
    - **Development of tools that to use real-time traffic and travel information data for dynamic/intelligent network management (3.5.1);**
    - **Development of new technical standards for ticketing, information integration, charging systems and satellite positioning applications as well as research on the interoperability of systems and policies (3.5.2);**
    - **Improving data collection on congestion and the environmental situation (3.5.3).**

2.6. Cooperation between stakeholders

The biggest barrier against a wide implementation of sustainable mobility measures is the fragmentation of institutions and actors and the extreme variety of local situations, practices and cultural habits.

The main obstacles to the cooperation between stakeholders are the lack of a shared "sustainable urban mobility" vision, a lack of European industrial competitiveness vision, and a focus by every stakeholder on its "core activity", while urban mobility is

the result of a very large combination of factors. This situation results in the following trends:

⇒ It is difficult to set up common EU targets for a sustainable urban mobility
⇒ EU R&D cooperation is most often limited to benchmarking
⇒ There is a low/very low interest in a technical coordination with other cities and/or regions and/or states (there are sometimes national approaches, but very scarcely European coordination)
⇒ A governance problem at European level for the fulfillment of sustainable urban mobility policies is the weak representation of local competent authorities in European instances
⇒ Common tools across Europe are not short term business cases and therefore are not a priority for local stakeholders

Innovation is an area where additional difficulties have to be faced:

- the management of innovation is a time consuming decision making process, which conflicts with the short life cycle of ITS products;
- the full deployment of innovative products in mega cities requires huge investment;
- when considering urban public transport assets, the short life cycle of components is opposing the long life time of rolling stock infrastructure.

The result is a low interest from stakeholders for EU solutions requiring a large consensus between decision makers from different countries. In most cases, cooperation for deployment remains limited within national or even regional borders. This is why a **transverse co-operation** is needed ("let's improve together"): stakeholders should open-mindedly cooperate in favor of more integrated urban mobility systems over time (inter-modality, co-modality, land use and transport… in a short term and in a long term perspective), which means widening their interest to other markets than their usual one.

European research should address the knowledge, analysis and measures involving cooperation between urban mobility stakeholders at different levels:

- A city and its hinterland;
- The European internal market (with no national barriers);
- The global market, where Europe is competing with other parts of the world.

Numerous topics would benefit from European research actions related to urban mobility:

- Defining cooperative mobility
- Raising awareness about the needs for cooperation
- Defining adequate cooperation
- Incentivizing cooperation
- Understanding the relationship competition – cooperation
- Achieving together standardization, beyond benchmarking

- Developing the robustness and resilience of transport systems (facing and recovering from incidents and disasters)
- Improving local integration
- Improving European integration
- Improving European strengths in a global economy
- Improving market uptake of EU R&D research
- Training and education
- Tackling together – and worldwide – the global economic challenges

With reference to EURFORUM SRA, the component "cooperation between stakeholders" – which was not very developed in EURFORUM - is gathering the following topics (those in bold characters are those which received a high priority from UITP survey):

- Fostering the use of integrated planning approaches:
    - Analysis of training needs and development of further training programmes for professionals across Europe for a better understanding of urban planning objectives and processes (2.5.1)
    - Further guidance on the integration of land use and transport planning concerning non-institutionalised ways of cooperation, participation and flexible planning processes to develop strategies for improving consensus building and acceptance of solutions while speeding up planning processes (2.5.2)
    - Incentives and support for consistent implementation of municipal environmental plans integrated with other plans impacting the urban development (2.5.3)

- **Compatible urban mobility services (3.2):**
    - **Standards for interregional interoperability of urban mobility services / white spots (3.2.1)**
    - **Clear, concise and readable signage in public transport networks and their surroundings (3.2.2)**
    - **Integration of car and bike sharing in the urban transport system (3.2.3)**

- **Development of sound business models and organisational frameworks (3.4)**
    - **Understanding the costs of different systems to determine the feasibility of future pricing systems (3.4.4)**

- **Reducing negative impacts of urban transport (4.1)**
    - **Urban road safety: taking into account the mix of transport modes (4.1.1)**
    - **Improving the security of transport systems (4.1.2)**

- **Clean and silent vehicles for an environment-friendly urban mobility (4.1.3)**

2.7. Data and Models

All above components rely on:

- collecting and sharing appropriate urban mobility data and
- developing and using appropriate models supporting analysis, forecasts, economic and multi-criteria analysis and decision-making

This component is one which has to be supported all over time by European research, as it can always be improved and complemented.

With reference to EURFORUM SRA, the component "Data and Models" is gathering the following topics (those in bold characters are those which received a high priority from UITP survey):

- Developing approaches for integrated planning (2.4)
    - **Advanced models integrating land-use, transport and environment (2.4.1)**
    - **Development of easy-to-use decision support tools which can help local authorities to assess the possible impact of broad integrated policy packages within sustainable urban transport planning (2.4.2)**
    - Development of adequate policies to direct locations of new housing and urban activities in more consistency with sustainability goals (2.4.3)
    - Development of procedures for systematic transport impact assessment of new land uses in order to enable promotion of better integrated locations (2.4.4)
    - Systematic analyses of the advantages and disadvantages of different institutional settings and ways of horizontal and vertical co-ordination in land use and transport planning (2.4.5)

- Urban Transport Demand Analysis And Modelling For Policy Support (5)
    - Improvement of data collection on the issue of passenger transport (5.1)
    - Improvement of data collection on the issue of urban freight transport through joint efforts (5.2)
    - Standardisation of survey design and indicators for urban passenger and freight transport (5.3)
    - Improving methods like data fusion and synthetic matching (5.4)
    - Improving complementary data collection and reliability of data (5.5)
    - **Strengthening our understanding of user aspects by modelling user behaviour (5.6)**

- Improvement of transport models integrating all fields of urban planning and management (5.7)
- Reduction of barriers for practical use of up-to-date models (5.8)
- Improvement of urban freight transport models and support of their application (5.9)

CHAPTER V. Priorities for ERRAC Urban Mobility Roadmap

1. First priorities in time

Discussions within WP03 working group led to give first priorities in time to the following topics:

- **Integrated urban mobility systems and governance:**
  - The first priority is on the **pilot implementation of the recommendations of the former FP7 European Research project IFM**, dealing with the interoperability at European level of off-line contact less ticketing management serving different fare applications on a single media.
  - **Integration of traffic and travel information** both at the local level and Europe wide (through technical harmonisation and voluntary standardisation), with customer-oriented policies and measures per category of public transport users (depending upon age, activity and social groups). The **development of a travel planner at EU scale** is a top priority to allow transport users to be better informed on transport options from origin to destination across Europe.
  - Research on **new mobility services** (transport supply) including tailored services, and on the provision of **location-based urban services** in addition to the core public transport supply.
  - Research on **integrated land use, transportation and mobility planning and management,** covering short term or long term targets and taking into account the interaction between new activities settlements and transport services.
  - As presented above for rail, one priority is on the **design and operation of multimodal interchanges combining a large variety of transport modes** (public or private) and taking into account new opportunities of modal combinations (passenger and freight) and of new technologies of information and communication.

- **Innovative infrastructure**

  Building new infrastructure in urban areas is necessary to face the expected growth of mobility needs, especially on public transport, while facing new constraints:

  - public resources are increasingly restricted both for investment and operations;
  - environmental concerns are everyday more stringent;
  - legal processes are more and more time consuming and largely open to citizen participation.

  Research priorities are covering technical, social and financial issues:

- **New infrastructure concepts reducing LCC** and covering improved design, faster and cheaper construction and easier operations and maintenance ("intelligent infrastructure").
- Research on **social acceptance of new infrastructure**.
- New **sustainable funding methods**.

- **Freight and urban transport interfaces and complementarities**

  - **new city-logistics concepts**.
  - impact of societal changes on commercial behaviour and goods delivery in urban areas.

- **Improved knowledge of users needs and behaviour**
  Society is changing in its social composition and at the same every given social category is changing its behaviour in a global and connected economy. Offering attractive and competitive public transport services calls for a better understanding of citizens' expectations and possible reactions to innovative mobility measures and services. A large variety of socio-economic studies have to be developed, including on:

  - **Social determinants of mobility behaviour of individuals and firms**: which factors determine the choice of dwellings and offices location and the choice of travel modes and destinations? How to measure the influence of changing life-styles, social norms, social perception? How a customer does build one's opinion/image on mobility's options, and under which conditions his opinion/image and behaviour can be changed?
  - How to **translate customer expectations into functional requirements** for adapting services or developing new ones - without negative impact on privacy? How to measure the impacts on the level of demand for passenger transport?
  - **Defining accessibility concepts** as a tool for measuring impact of urban land use and transport policies, and as objectives for the development of new transport services.
  - **New management of urban public transport services, especially in case of incidents, taking into account connected social networks of customers** reacting on real-time and location based.

- **Innovative technologies, tools and products**
  Innovation is speeding up and enlarging the variety of available information and communications technologies. The challenges are:

  - **to set up at European level harmonised or standardised solutions** on a voluntary basis taking into account the subsidiarity principal;
  - to **identify the most promising tools and products, including software**, for new intelligent services serving different social groups, different transport modes, different purposes, different territories and different periods of time.

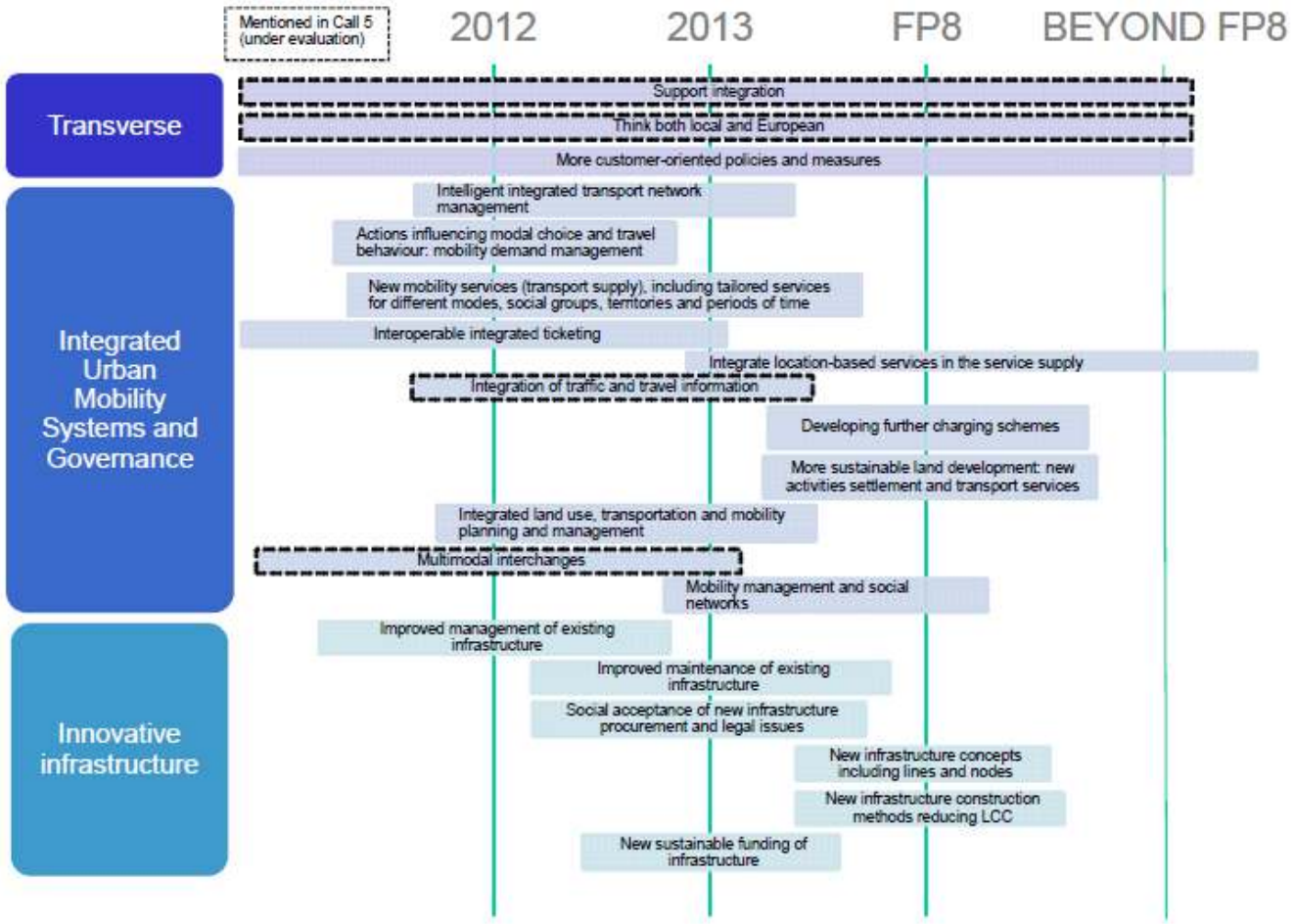
- **Cooperation between stakeholders, the "external dimension"**

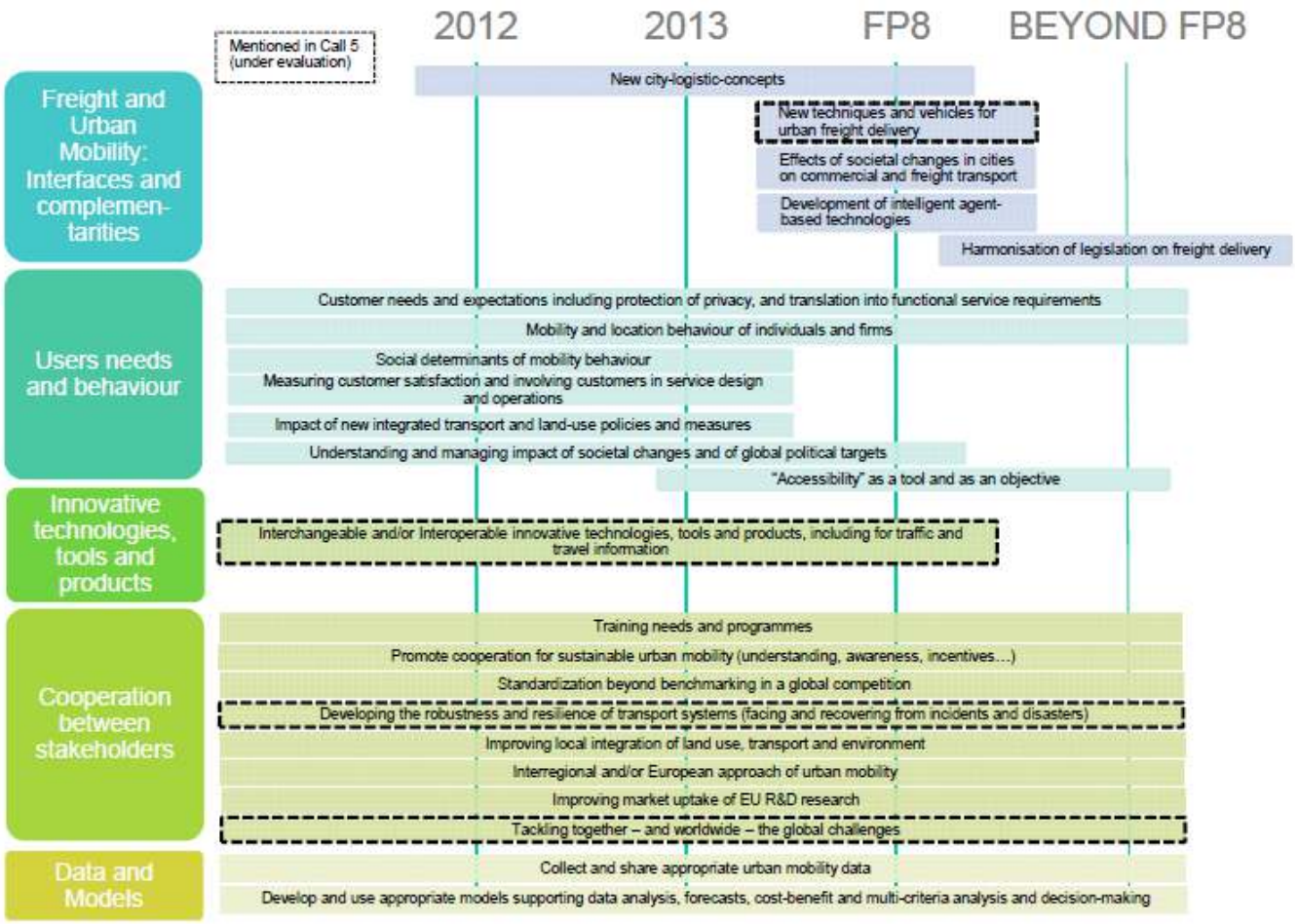
  Cooperation between stakeholders is key for the success of any sustainable urban mobility policy over time. Research topics in this area are numerous and strategic:

  - How to **improve awareness and facilitate understanding** of sustainable mobility challenges and solutions by relevant stakeholders at various institutional levels depending on the territorial point of view (city, region, country, whole Europe)?
  - How to **integrate land use, transport and environment policies** in a coherent way over time at these various levels, with a view to tackle the global challenges?
  - **Which standardisation** – going beyond benchmarking – in a global competing economy?
  - How to **develop jointly the robustness and resilience of urban transport systems** (facing and recovering from incidents, accidents or disasters)?
  - How to **develop the appropriate skills and training tools and programs** for the transport industry (manufacturers and operators) and policy makers?

- A **transverse priority** along all major research components is the **development of urban mobility relevant data collection and sharing**, and the **development and use of harmonised models** supporting data analysis, land use and transport forecasts, cost-benefit and multi-criteria economic analysis and decision-making.

2. Pictorial view




2012
2013
FP8
BEYOND FP8
Mentioned in Call 5 (under evaluation)
Freight and Urban Mobility: Interfaces and complemen-tarities
New city-logistic-concepts
New techniques and vehicles for urban freight delivery
Effects of societal changes in cities on commercial and freight transport
Development of intelligent agent-based technologies
Harmonisation of legislation on freight delivery
Users needs and behaviour
Customer needs and expectations including protection of privacy, and translation into functional service requirements
Mobility and location behaviour of individuals and firms
Social determinants of mobility behaviour
Measuring customer satisfaction and involving customers in service design and operations
Impact of new integrated transport and land-use policies and measures
Understanding and managing impact of societal changes and of global political targets
"Accessibility" as a tool and as an objective
Innovative technologies, tools and products
Interchangeable and/or Interoperable innovative technologies, tools and products, including for traffic and travel information
Cooperation between stakeholders
Training needs and programmes
Promote cooperation for sustainable urban mobility (understanding, awareness, incentives…)
Standardization beyond benchmarking in a global competition
Developing the robustness and resilience of transport systems (facing and recovering from incidents and disasters)
Improving local integration of land use, transport and environment
Interregional and/or European approach of urban mobility
Improving market uptake of EU R&D research
Tackling together – and worldwide – the global challenges
Data and Models
Collect and share appropriate urban mobility data
Develop and use appropriate models supporting data analysis, forecasts, cost-benefit and multi-criteria analysis and decision-making

ANNEXE 1: ERTRAC Road Transport Scenario 2030+

Urban Mobility

Urban mobility is the mobility of persons and goods on the urban environment, facilitated by the management of the urban mobility network.

The future of urban mobility will mainly depend on four key drivers: *climate change; energy supply and cost; demographic change and changing society****; and*** *urbanisation.*

Regulation, adopted by all levels of government to address *climate change* ***and contain the level of GHG emissions from the transport sector, is likely to trigger a broad range of developments affecting the future of urban mobility. For example, restricted access to city centres, including through pricing, according to the time of day, the type of vehicle and the purpose of the trip; and similar restrictive measures to encourage society to become more aware of the impact of their personal behaviour, will have a direct influence on personal mobility.***

*Demographic change and lifestyle trends****, such as the ageing of the population and the growing number of immigrant, will have a significant impact on Europe's future and will put pressure on the urban mobility systems of the major European cities. These are great challenges on the path towards sustainable urban mobility. The level of economic development is also an important factor. The economies of European cities will continue to grow for the foreseeable future, and there is no reason to believe that such growth will be substantially different from the average level of economic growth across Europe. The current financial and economic turmoil highlight the fundamental need for a healthy urban economy as a prerequisite for social stability, and this will also be an essential element for the successful design of urban mobility systems in the future.***

A growing urban economy will, according to current trends, lead to a growing urban transport demand. In contrast to the case for long-distance freight transport (where the total mileage will, to a degree, be decoupled from economic growth due to the fact that industrial production will be localised much closer to, or even within, the EU itself), the growth of urban distribution and transport will remain dependent on economic growth. This implies that, as the economy grows, there will be a need to develop the urban structure at a faster pace than that required to develop the interconnecting infrastructure.

The evolution of energy supply and the increasing cost of energy will lead to a demand for higher levels of efficiency in the transport network. The challenges will be to react to the increasing cost of transport fuels and to satisfy the mobility needs and expectations of a growing economy while also addressing the potential negative impacts on the environment resulting from an increase in the level of urban mobility.

The future of urban mobility systems can be considered by observing its four key components:

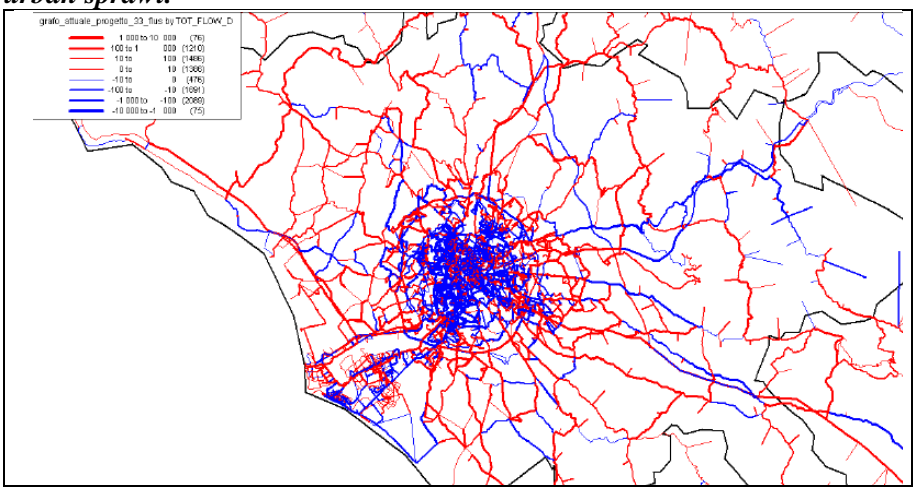
1. The level of demand for urban mobility, driven by consumer needs and behaviour.
2. The urban (infra)structure.
3. The availability of solutions for enhanced urban mobility (e.g. advanced vehicles, services).
4. The state of the urban mobility system as a whole.

Challenges for the future urban mobility system, the example of Rome, Italy

Every city has its own characteristics, and it is therefore necessary to exercise care when making assumptions about the future of the urban mobility system throughout Europe as a whole. For example, some cities may possess extremely dense rail networks, while many have none. The architectural heritage and historical or artistic value of others may place

unique constraints on mobility development. Unfortunately, the lack of specific data on European cities means that a pan-European assessment of the general trends in urban development is not a straightforward exercise. However, it is possible to identify several key patterns.

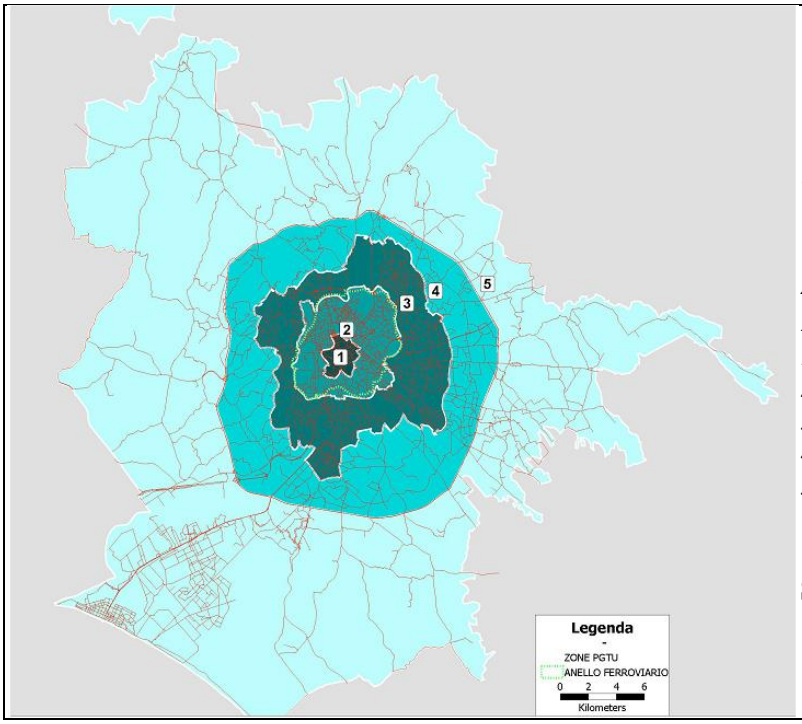
Future urban developments will be driven by the effects of urbanisation, globalisation, demographic changes and economic development. An example of the consequences of urbanisation can be seen in the case of Rome, Italy (see maps below). The tendency is for a gradual decrease in traffic flows in urban centres, with increasing concentrations around the periphery of the cities. Surveys and forecasts in other cities, in particular in France, show the same pattern over time. Hence, the challenge is to address a tendency towards urban sprawl.



Comparisons of traffic flows in Rome at peak hours, 2006–2012
Blue indicates a decrease in traffic volumes
Red represents an increase.
Source: ATAC Spa

In the case of Rome, with its anticipated growth in both population and jobs, it is unlikely that the city will be able to contain the growth of urban sprawl, despite its best efforts. As a result, the demand for mobility in the urban periphery will continue to grow. Investment in public transport (PT) [5]will attempt to address this growing demand. Further growth in the demand for mobility will lead to an increase in traffic, though to a lesser extent. As a result, CO_2 emissions in the urban periphery will continue to grow while, in contrast, they are likely to fall in the city centre as a result of policies implemented to manage demand and support sustainable urban mobility.

[5] Public transport is used to refer to passenger transportation services available for use by the general public.



Variation in CO_2 emission in Rom in %

Zone	*Scenario PGTU 2012*
1.	*37,2%*
2.	*15,7%*
3.	*16,2%*
4.	*17,7%*
5.	*18,2%*
Total	*4,2%*

Source: ATAC, Spa

This scenario is most relevant for large urban centres. To a lesser extent, it is also relevant for dynamic, medium-sized cities, although for many of these there may be the temptation to build new infrastructures. Such development will be largely dedicated to public transport to ensure a more sustainable degree of mobility.

Common-sense scenario for Urban Mobility
By 2030, urban mobility will have changed due to socio-demographic evolution (ageing, immigration), urbanization, the increase of energy costs, the implementation of environmental regulation, and the further diffusion of sophisticated Information and Communication Technology (ICT) applications in virtually all aspects of life. The result will be a complex, integrated system, managed with greater efficiency to answer the challenges of reducing its environmental impact and minimising congestion. • ***Personal mobility demand will diversify. This will be driven partly by socio-demographic changes such as ageing, income distribution and immigration. There will be a greater choice of mobility solutions, often multimodal, and new information services that will become readily available to the consumer. By 2030, the urban traveller will go more or less seamlessly from door to door. Multimodal hubs will provide the urban traveller with easy transfer between modes. Collective transport services will diversify, and public transport will grow significantly in major urban centers.*** • ***The demand for public and collective modes of transport will increase, as a consequence of socio-demographic changes, urbanization and continued urban sprawl. This will create financial pressure on the mobility system as a whole and on public transport services in particular, while at the same time public finances will have to cope with an increase of social spending, also due to socio-demographic changes. The ability to answer this challenge and ensure the provision of good quality public transport and collective mobility services will be key to achieve the vision of a sustainable urban mobility system. Part of the answer will be provided by public transport systems (urban rail and bus systems) which will become even more energy efficient through advanced energy storage technologies and use of new materials. They will provide high levels of interoperability, accessibility, safety and comfort.*** • ***Urban development and environment policies, land use and sustainable urban mobility planning will become increasingly integrated. Pan-European efforts to generalize approaches for sustainable urban mobility plans will further support this trend. It will only partly contain urban sprawl and it will encourage an evolution towards polycentric urban areas. Public transport systems (bus and rail) will contribute to shape the future urban environment.*** • ***Although the urban transport infrastructure will be optimized to the very limit of its capacity, financial and spatial constraints will prohibit the full accommodation of the increase in (mobility demand. Hence, demand management, including pricing policies, will be implemented on a large scale in cities across Europe to influence behaviours and as part of their mobility network management strategy. Priority will be given to sustainable transport modes and services, including walking and cycling. Soft modes will be further encouraged, and be considered as alternative modes of transport for certain trips. The rate of motorization will nevertheless not decrease significantly.*** • ***New services and business models will emerge for urban mobility, encouraging public and collective services, journey sharing, shared ownership of vehicles. They will address the increase in mobility demand, to mitigate the impact of mobility on the environment, and to address the challenges presented by the evolution of energy supply and the rising cost of energy. Access to these services will be made easy, e.g. by single ticketing concepts, allowing the urban consumer to travel leisurely and seamlessly from door to door.*** • ***ICT will become fully integrated in the everyday life of the urban consumer to the extent that he/she will be on-line continuously and will take part actively in a vibrant virtual community. In addition to receiving mobility information from the service provider, the urban traveller will actively and passively reciprocate to the service provider, leading to real-time, accurate and reliable mobility information services.*** • ***ITS and the increasing availability of mobility information will play a major role in***

optimising network efficiency and allow for the selection of the optimal combination of travel modes for a specific destination by the traveller. Traffic and Travel Information will support the implementation of advanced management systems (through cooperative systems) and mobility demand management.

- *The demand for advanced (home) delivery of goods and services will increase as the urban consumer continues to have access to an increasing variety of on-line information and e-commerce services.*
- *Urban logistics strategies will lead to a greater efficiency in urban freight delivery, with greater integration of urban freight challenges in urban planning. This will allow for the consolidation of freight delivery and the optimum use of the infrastructure. Transfer hubs will provide an interface between long-distance freight transport and urban freight deliveries. 'e-freight' will be integrated with urban logistics.*
- *The urban vehicle fleet will undergo a transition towards electrification and diversification in design. An increasing number of cars in cities will be electric. The demand for public transport and urban freight delivery will have a strong influence on new vehicle design. The share of hybrid and fully-electric vehicles will increase progressively. In addition, the shifts to more tailored public transport and urban freight delivery will lead to a greater diversity of vehicles on the urban network, with the appearance of modular vehicle design allowing using vehicles better fitted to the urban environment and mobility demand. All types of vehicles will be increasingly energy efficient, including urban rail vehicles.*

Consumer needs and behaviour

By 2030, the personal demand for urban mobility will have changed significantly due to economic, social and demographic changes.

Evolution of the demand in response to socio-demographic changes

Personal mobility demand will evolve and be increasingly diversified according to the category of user as dictated by a person's age and social standards and trends (increase in the number of single households for instance). Much more than today, the mobility service providers will offer business models that are dedicated to the specific purpose of the desired journey (for instance school, work, leisure).

Mobility demand will consist of three main components: demand for flexibility of mobility services; accessibility to services of all types; and assurance of safe and secure travel. Such expectations will be met only if the solutions prove to be cost-efficient both for the user and for society in general.

One answer to the ageing of the population will be the increase of immigration. Economic immigrants are likely to concentrate mainly in dynamic urban areas, and they will often be poorer and younger than the average of the population at the time of their arrival. They will therefore contribute to an increase in demand for short-distance urban transport, in particular public transport.

It is also expected that a larger share of the population will have a lower income due to ageing of the European population. The subsequent division in personal income/wealth, combined with increased costs, will lead to a situation where part of the elderly population and the growing less-affluent immigrant population will have limited access to personal mobility. These population groups traditionally use more public transport than do other demographic groups. In the case of wealthier segments of the population, older people will be more likely to travel in the future than their counterparts today. The preferred mode of urban travel will depend on the quality, accessibility and price of the available public and collective transport.

The private car will still be the preferred mode of travel for the older generations and for families with young children. It will remain the least physically challenging mobility solution for older people, and will therefore be the most obvious and, in many cases the only, mobility choice. The elderly will not be as comfortable with other modes of transport because they will have driven most of their lives, unlike younger generations.

In parallel, parts of the urban population will change their mobility behaviour due to

environmental consciousness, attractive alternative transport modes and demand management policies. User needs will create a demand for more and high quality collective transport services. This demand will grow with the provision of alternative services inside public transport to create productive personal or professional travel time.
As a result of these combined factors, the demand for public transport will increase significantly.
But the same ageing of the population will also result in a higher burden on public funding (for social and health care), hence the supply of public transport will be challenged by a lack of available public finance. It is worth remembering that the operational income of public transport does not cover its operational costs, with the operational deficit being mostly covered by public funding.
By 2030, a significant part of the poorer elderly community will be at risk of having even less access to mobility because these individuals will not be able to walk or cycle as an alternative to motorised forms of mobility.

How ICT will influence urban mobility demand

Due to the development of an information-driven society, the mobility demand will be well understood by industry and public bodies, and their services and products will be highly tuned in to that demand, providing seamless door-to-door mobility for many travellers.
New technologies, and new management and organisational models, will support distance working. This may lead to a decrease in commuter travel and, at the same time, accelerate the emergence of polycentric cities, facilitating a reduction in the demand for travel.
New technologies should also allow for an increase in the provision of 'e-services', which may also result in a reduced demand for personal mobility.
The growth of social networks and virtual communities, possibly at the expense of physical communities, would reinforce the same trend. However, this may contribute to urban sprawl by lowering the demand for, and the need for access to city centre services.
Users of mobility services will increasingly constitute 'groups', e.g. company groups, social groups, etc. This could lead to the provision of targeted community transport services, and various forms of demand-responsive transport.
The information flow in city centres will provide real-time, precise and accurate mobility information to the consumer, as well as other benefits. This will enable the consumer to select from a wide variety of alternatives and possibly to follow the lead provided by the appropriate information services.
It is expected that new technologies will trigger a growth in long-distance travel for both business and leisure. This will lead to an increase in traffic to and from travel hubs such as rail stations, ports and airports, which themselves will be increasingly integrated into the urban transport system. The increase in long-distance transport will, in turn, lead to an increase in specific short-distance services providing connections for long-distance travellers. However, this pattern will be possibly offset by increasingly competitive business practices that will most likely lead to a fall in the general demand for business travel. The greater use of new technologies to better support e-services will enhance this trend.
The increased use of e-commerce will generate more journeys for urban goods delivery services, in spite of efforts made to rationalise urban logistics.
The number of actors involved in the distribution of goods may be greater than today due to access to a broader range of services and a greater diversity of goods. This could also contribute to an increase in urban goods delivery traffic.

Influence on demand and behaviours through policy

To influence mobility demand, optimise the efficiency of urban mobility systems and minimise emissions resulting from urban mobility, a majority of cities will implement comprehensive and integrated planning, including demand management schemes. These will cover all types of vehicles, i.e. not only private cars but also delivery vehicles and powered two-wheeled vehicles.
Policies, including fiscal policy will increasingly limit and tax carbon emissions, and hence

influence individual and collective behaviours. This will accompany the increased application of the internalisation of external costs.
The cost of mobility will be an important factor when considering the amount, and the mix, of mobility that a person will be able to afford. As travel in urban areas will become significantly more expensive due to policy measures and increasing energy costs, the mobility mix should shift significantly to the cheaper modes of travel (e.g. public transport, bicycles or walking).
Individuals in cities will become increasingly aware of their environmental impact and, in particular, of their impact on climate change, via the provision of information on their CO_2 emissions at each trip. They will also be better informed about local air quality and the impact of noise on health.
An increasing number of companies will begin to invest in more sustainable transport; they will employ 'green marketing' techniques in an attempt to raise their environmental profile and increase public awareness, though sometimes with conflicting messages.

Urban structure

Although cities will change and their landscapes will shape mobility systems over time, this will be a slow process and no radical changes in land use should be expected. Rising energy costs, economic and private activities, as well as policies and regulation, will shape the evolution of urban design but their effects are likely to be gradual.
The importance of integrating land use and mobility planning in addressing the demand for urban mobility will become increasingly recognised and taken into account in urban development projects. For this reason, if urbanisation continues to lead to more urban sprawl, the pace of urban sprawl will be slower than today.
New urban rail and bus systems with highly attractive designs and services as well as good intermodal connections will be increasingly used by city planners and decision makers to reshape and redevelop parts of the urban environment.
The decreasing size of households, which is also a consequence of demographic and lifestyle changes, will slow the pace of urban sprawl. This, in turn, will contribute to the (re)vitalisation of urban centres where, in general, economic services will continue to be conveniently located to reach the population. City centres will continue to be attractive for business and residential purposes.
People will be encouraged to live closer to their jobs, or at least to reduce their need for commuting. For this purpose, a functional mix of services and housing will be encouraged in cities and neighbourhoods will be more heavily populated. Policy and regulations will play a big role in this change.
Urbanisation will lead to an increase in commuter travel in the medium term, until technology enables a significant reduction in business travel. Sustainable urban transport planning, land taxes and land-use planning will contribute to the emergence of polycentric urban areas, although this may not prevent the growth in commuting. The demand for collective transport is therefore likely to increase, as will the number of car journeys.
Travel between suburbs will also increase, which will support the demand for new public transport services on these routes. Urban sprawl will therefore create further pressure on the financing of public transport.
Overall, the volume of transport in cities will continue to grow, although possibly to a lower extent than today and at a slower pace than the anticipated global rate of increase. This growth will not be matched by a comparative increase in transport capacity.
Cities in regions of net migration will decline in population, and their economies will therefore also decline. This will lead to less support for services and facilities in general which, in turn, will encourage an urban planning approach that focuses on the development of specific neighbourhoods. Infrastructure will be adapted to accommodate the evolving demographics. Where the existing infrastructure provides sufficient capacity, it will be more difficult to influence mobility patterns and contain urban sprawl.
Future physical infrastructure for urban transport will experience a radical reallocation of road space, in particular between transport modes and between type of road users, with the

specific allocation of corridors to certain type of vehicles, users or services. Traffic speed may also be taken into consideration.. This will go beyond what is currently being experienced across Europe. The transport network will also evolve in response to the development of new vehicles and services for an ageing population.

Urban mobility services and vehicles

Towards enhanced public transport and new mobility services

The various types of collective transport will adapt to changes in traffic volumes. Mass public transport will remain essential for transporting large numbers of persons, and will be complemented by new mobility services. These will emerge as alternatives to the use of private vehicles with new forms of vehicle ownership and usage patterns for all types of vehicles. In this framework, the provision of more flexible mobility services will keep growing, especially in the centre of major urban areas where space will be increasingly scarce and expensive, providing that a culture for the provision and use of these services continues to emerge. They will be supported by new business models. Examples include shared and collective forms of private ownership such as car sharing, car pooling, and the use of public bikes and cars. Car pooling will be stimulated through company mobility plans, which will become standard practice. Sustainable urban development will provide the facilities and organizational support for car sharing and car pooling for its inhabitants.

The financing of mobility services will face significant constraints due to the increasing pressure on public finances and the lack of business models. Various ways of generating revenue (e.g. road pricing) for investment in the transport system will be explored.

There will be a growing number of households in the city centres that will share a vehicle or will have a subscription to collective services in order to minimize such expenses.

This evolution will trigger the development of new activities in the sector that are aimed at providing integrated mobility services to the private and commercial client, e.g. seamless 'door-to-door' transport for the traveller. As a consequence, the traditional distinction between the actors in the transport sector (e.g. vehicle manufacturers, public transport operators, road administrators, etc.) will diminish with their conversion into mobility solutions providers. Mobility service integrators, as well as other types of new actors, will appear.

The growth of more diverse public transport services and the development of new mobility services to answer a changing demand, will also serve to address groups of persons and new patterns of leisure activities6, in particular for the older population.

Peak transport hours are already increasing, with more mid-morning leisure travel. Different speeds and modes of transport may be demanded by different sectors of the population; modes and services (e.g. buses, underground rail systems) may become targeted at specific age categories, and demand-responsive transport services will be further developed. Public transport vehicle design will also react to these changes.

There will be a growth in both rail- and road-based public transport services. Bus systems providing enhanced services (e.g. rapid transit facilities) will begin to operate in cities across Europe. Several advanced and automated systems, such as cooperative systems, will emerge in collective transport. These systems will provide services with greater flexibility to adapt to variations in demand, time and location, e.g. by using modular vehicles.

Collective transport services (e.g. taxis) will become better integrated with the rest of the mobility network in general, enabling improved communication of information to travellers. Greater consideration will be given to energy supply by the transport system as a whole.

A new generation of 'intermodal nodes' (parking, stations, etc.) will contribute to a smoother and more enjoyable transition between private and collective modes of transport.

The quality of public transport services will continue to depend also on the density of the city and on the urban structure. There will be a need to develop business models for public transport in low-density areas.

[6] GHG: route to 2050

Nevertheless, the motorisation rate (i.e. the number of vehicles per inhabitant) will not decrease significantly.

Vehicles for the urban network

New generations of vehicles for urban goods delivery will be developed. They will be more fuel efficient and rely much more on electric power. They will be designed with lower emissions as a priority. This will be driven by the introduction of more stringent controls to restrict commercial vehicle access to urban areas, and which favour 'cleaner' vehicles. Depending on their function and the nature of the delivery, electric-powered vehicles will become popular, as will hybrid and fuel-cell powered vehicles. The movement of goods from long-distance freight vehicles to urban goods delivery vehicles will be managed in the framework of the urban logistics management system.

Goods vehicles will increasingly be modular and have a size more adapted to the urban environment and the new patterns of urban goods delivery.

The increased price of energy, combined with the reduced availability of fossil fuels, will be a significant incentive for private, public and commercial transport providers to consider alternative propulsion concepts, especially in the urban area where alternative fuels and energy supply structures are more cost-effective to implement. The obvious and most likely path forward will be the progressive deployment of new, more energy-efficient vehicles. These will most probably take the form of smaller urban cars with non-petroleum based propulsion systems, and will become the dominant non-public mode of transport in urban areas. A combination of physical, fiscal and other new measures will be put in place to facilitate their continued development. For public transport, new vehicles will also be significantly more energy efficient, including for rail vehicles with the deployment of more efficient energy storage and recovery systems.

Electric vehicles will constitute a growing portion of the urban passenger transport fleet, with an estimated five million units on European roads by 2020 (about 2 per cent of the European fleet of passenger cars). By 2030, it is expected that more than 20 per cent of new passenger cars sold will be fully electric or hybrid-electric vehicles. The deployment of electric road vehicles will also impact on the pattern of vehicle usage in the cities, and new types of vehicles will emerge, e.g. dedicated 'city cars' designed purely for local, short-distance travel.

Because the price of electric vehicles will be significantly higher compared with today's vehicles, the policy-driven introduction of such vehicles will lead to new business models. Car sharing and public car schemes for instance will contribute to the increasing penetration of electric vehicles in urban areas.

For public transport (mainly lighter vehicles), the use of hybrid and plug-in electric systems will be introduced. Specific systems will be designed to fulfil the requirements of various types of vehicles, for instance electric buses but also waste collection vehicles, which will require larger energy storage due to high daily mileage and specific fast charging solutions. Intelligent management of the power source used in public transportation will also enable the optimisation of energy use for maximum efficiency.

Other propulsion technologies will also be explored or become more common. These could include biofuels and fuel cells, but also CNG which is likely to be used for buses, taxis and intermediate services. This will be particularly common in countries that possess national resources of natural gas.

A variety of new specialized vehicle concepts will emerge that will be tailored to the needs of the consumer, with different functions and forms, and with a predominance of smaller vehicles in the urban environment. For example, new designs may specifically target the requirements of the older generation for leisure-related mobility.

The shifts to more tailored public transport and urban freight delivery will also lead to a greater diversity of vehicles on the urban network, with the appearance of modular vehicle design allowing the use of vehicles better suited to the urban environment and mobility demand. All types of vehicles will be increasingly energy efficient, including urban rail vehicles. Such developments will be driven by the growing financial pressure on public

transport operations. Other responses will be to increase passenger capacity, thus reducing operating costs and optimising capacity, consumption and frequency. Further reduction in operating costs for public transport will be achieved through intelligent vehicle maintenance management using ICT.

ITS will permit efficient in-vehicle energy management and provide comprehensive road and traffic data to enable the driver to adapt more effectively to the urban environment and urban traffic conditions. ITS will also support 'eco-driving', reducing fuel consumption, vehicle emissions, accident rates and noise levels.

Vehicles will become increasingly connected with both their operating environment and their passengers. Information received by the vehicle will have the potential to be personalised for distribution to individual occupants, in both private and public vehicles. Such access to personalised information will encourage the development of new business models for the deployment of cooperative systems.

In-vehicle ITS will contribute to road safety in urban areas, by incorporating features such as pedestrian and cyclist detection systems, and road safety and hazard information. Such systems will be supported by cooperative systems.

As infrastructure and vehicles become more advanced, a capacity for automated and fully guided vehicles will emerge, controlled either from a central management system for private vehicles, or combined with guidance systems for public transport vehicles. These concepts of vehicles will contribute, in certain cases with new modes of ownership and usage, to make less relevant the traditional distinction between private vehicles and public transport.

Cycling will grow as a fully recognized transport mode in the smart urban mobility system of the future. New bicycle types will be developed which better fit the profile of the various types of users, and which provide enhanced levels of safety. Their use will be supported by ITS and they will become integrated into cooperative mobility systems in the city.

Powered two wheelers will also offer flexible mobility solutions to the extent that the vehicles limit their impact on the environment and contribute to sustainable and efficient urban mobility. Their use of space will need to be limited and they will be required to provide a high level of safety.

Urban mobility systems

The pressure on the urban mobility system in the next 20 years, created by the rise in energy costs, financial constraints on public transport, urbanisation and the evolution of mobility demand, will require greater efficiency in all components of the system as well as in the management of the urban mobility network as a whole. This will require the integrated management of the movements of people and goods, including all types of vehicles, private vehicles, soft modes, public and other collective transport services, triggering higher quality mobility services and solutions and the deployment of more energy-efficient vehicles. In this framework, private car ownership will remain the dominant mode for personal transport.

Infrastructure use will be optimised with dynamic management systems, e.g. to prioritise the use of available road space, and through the development of dedicated new infrastructure.

More efficient use of energy and the prioritisation of functional mobility needs will be key factors in addressing both the increase in the demand for fuel and rising fuel prices. This will require the careful management of mobility demand, which will also be a major consideration for climate change, e.g. by introducing controls to reduce congestion, emissions and local pollution.

All urban areas will adopt some form of demand management. Several tools are available for this purpose, including road charges and pricing (dependent on time, place, type of vehicle, type of driver and possibly the nature of driving behaviour), parking management, and the restriction of access to urban centres, through for instance the introduction of congestion charging, 'low emissions zones', mobility credits or, in certain cases, carbon credits. In those parts of the city that are faced with tight environmental and spatial, as well

as public, budget constraints there will be a considerable degree of 'compulsory mobility'7 leaving less room for 'chosen mobility'8.

Support must be provided to the public to assist them in their travel planning arrangements to, and from, urban centres. This will be enabled by the development of integrated network management systems which, in turn, will rely on more advanced monitoring of the transport environment. A variety of data collected from across the network infrastructure will include information about temperature, humidity, local air pollution, noise, congestion, etc. Advanced traffic management systems will also have access to data relating to the traffic patterns of individuals. For example, information about the occupancy of vehicles could be used for dynamic traffic management, such as giving access to dedicated traffic lanes for high occupancy vehicles. It is likely that the data collected to support the real-time supply of information on travel options and mobility solutions for travellers will be provided by a range of planners/networks, and integrated into a common database. Network managers will attempt to adjust time and distance of travel, possibly using time as a variable to influence mobility patterns. These data will be also used for dynamic traffic management. The first large-scale dynamic traffic management systems will be put into operation in some European regions by 2030.

The development of affordable information systems and services will support complex multimodal journeys by providing information and payment facilities both before and during journeys. These systems will enable travellers to plan complex journeys by providing them with the available travel options, and they will also offer incentives (e.g. faster or cheaper travel options) according to the mode and time of travel chosen by the traveller. For each travel option, the individual will also be informed about his/her carbon impact and, consequently, whether or not a travel charge will be applicable. This may become a legal requirement in Europe.

On-line and off-line technologies with high-quality interfaces will be introduced to the market, to suit all user groups. The costs of such systems and services will be relatively small compared to the resources needed for major road infrastructure projects. The technology will be implemented both in the vehicle and at strategic locations along the road side.

These systems will rely on various technologies, e.g. 4G, Galileo and GSM and RFID sensors to gather and transmit data in real-time about traffic flow, optimal journey times and route choices.9

Questions remain, however, regarding the relationship between the constant supply of real-time information about available services, and the network's ability to deliver those services in practice. It is important to realise that information alone will not solve everything, and that its contribution to more efficient travel behaviour will most probably require some further study, not least with regard to the nature and degree of incentives required to encourage travellers to make optimal decisions when planning their journeys. Experience gained by network managers will become invaluable in addressing these questions.

New technologies, such as integrated ticketing and integrated, reliable information services will make access to public transport much easier and, in effect, provide an incentive to use the public transport services.

The use of ICT will contribute to reducing both travel time and urban congestion, but may add to journey distance, due to real-time route guidance and hazard warning10.

More efficient organization of urban logistics will be required, and this will be an

[7] Defined as the fulfilment of trips considered as essential for economic and social purposes (work, schools, etc.)

[8] Defined as the fulfilment of trips considered as non essential for economic and social purposes (leisure) from the point of view of the individuals

[9] Foresight

[10] GHG Routes to 2050

important issue in any transport and land-use planning process such as sustainable urban mobility plans (SUMPs). The integration between neighbouring urban centres to enable more efficient freight delivery, will be coordinated with SUMPs, as well as with the creation of urban logistics and distribution centres. In this framework, public consultation and stakeholder involvement will both be necessary to ensure the maximum efficiency of urban logistics strategies. These will cover issues including parking for loading and unloading in the urban environment, the use of dedicated infrastructure, and improved access to facilities, buildings and other developments for freight delivery. They will be supported by ITS which will also allow the integration of 'e-freight' into the urban logistics management systems. ITS will allow route guidance systems, an analysis of city logistics to, e.g. reduce the time spent by each vehicle delivering goods in the urban environment, and the efficient occupation of dedicated delivery areas for different times of the day.

Interactions between vehicles and their environment via an 'intermodal information platform' will enable travellers to access real-time, up-to-date information on collective transport services. Furthermore, such a system will be able to optimise a traveller's journey from door to door. For example, the system will already be aware of the traveller's location and when the next bus is due to arrive. All the system will need are the details of the traveller's destination, and the information platform will then mediate between travellers and vehicles already* en route *to determine the available options. These may include several possibilities: simply waiting for the next bus, the bus taking the traveller to the bus stop nearest to his final destination, or other travel options including details of any connections along the way.

A European observatory on urban mobility will be established to monitor urban mobility and collect the data needed to guide the development of urban mobility systems into the future.

Enthusiastic Alternative	Pessimistic Alternative
User needs and behaviour • Major retailers and freight operators will have a dominant position in the city markets, allowing them to optimise their delivery systems. • The urban population, supported by comprehensive and reliable information services, will be well aware of the environmental impacts related to their mobility behaviour; moreover, it will become socially unacceptable not to take such impacts into account. • In the more densely populated urban areas, where space and environment dictate the need for restrictions on mobility, a stringent system of permits and credits will be implemented to limit the carbon footprint of the individual traveller; such a system will be facilitated by the use of advanced ICT applications.	**User needs and behaviour** • As the dominant players in the marketplace refuse to establish common strategies, the urban consumer will be confronted with fragmented services, hampering the development of an efficient and multimodal personal transport system. In addition, the increasing use of e-shopping and e-services will lead to a rapid growth in urban freight delivery. • No reliable information will be available on the duration, cost and environmental impact of different modal choices, hence only a minority in the urban population will reach the high level of awareness required to adapt their mobility behaviours in an environmentally conscious manner.
Urban structure • Efficient land-use policies, coupled with tax incentives driven by mobility objectives, will lead to the emergence of dense polycentric cities. This will serve to slow down the increase in demand for travel, and will contribute to a decoupling of economic	**Urban structure** • Urban sprawl will not be mitigated and cities will continue to expand geographically. This will result in an overall higher energy consumption in urban areas. There will be greater localisation of specific commercial activities in different urban areas. These

growth from the growth in mobility demand. • The high urban density will support an adequate level of high quality, financially sustainable public transport services.	trends will result in an unsustainable growth in travel demand, and even stronger pressure on public transport systems.
Urban mobility services and vehicles • The market for electric vehicles will grow rapidly due to focused policies on energy and environment. By 2030, about 50 per cent of new cars will be based on hybrid-electric or fully electric technology. • In urban areas, all vehicles will be permanently 'connected' to their driver, to each other and to their physical environment (roads, buildings), as well as to different commercial and public services. This will provide real-time support for travel considerations, e.g. the locations of the cheapest vehicle charging points. • Automated vehicles will lead to the emergence of a range of new services. Private vehicles will remain the dominant model but their ownership will become increasingly collective. Traditional public transport will benefit from this evolution and will become strong across Europe. • A majority of personal journeys less than 5km will be made by walking or cycling, due to the implementation of safe and efficient walking and cycling facilities in cities.	**Urban mobility services and vehicles** • Electric vehicles will prove to be technically unreliable, and market take-up will be slow. Furthermore, the energy infrastructure required to support an electric vehicle fleet will fail to be developed on a sufficient scale. As a consequence, the traditional private car will remain the preferred mode of travel, and demand for such vehicles will increase. • However, the increasingly high relative cost of using traditional, personal vehicles will mean that a decreasing proportion of the population will actually be able to afford to own and use them. • Legal and liability issues will prevent the deployment of automated and guided systems.
Urban mobility systems • The 'personal mobility planner' will be universally accepted and used by all, giving full TTI to go from Edinburgh city centre to Novosibirsk. Travellers will be offered a broad range of mobility options corresponding with their choice of speed, price, emissions, etc. They will be offered full multimodal mobility packages from which they can choose the options best suited to their needs and spending priorities.11 • Distribution centres for urban goods delivery will become highly efficient businesses, enabling goods to be re-dispatched in fuel efficient and zero-emission vehicles for urban distribution, using optimal route choices and load factors. ICT will enable the supply of real-time information to retailers about goods delivery schedules, and to operators about changes in network regulation and access rules.	**Urban mobility systems** • Multimodal comprehensive information will be offered, but only in return for payment of high fees. Users of such premium services will receive a guarantee of their travel time and will have preferential access to segregated/dedicated lanes; however, the rest of the population will suffer from increased congestion. Liability and privacy issues will block the development of individualised and delocalized information services. • Transport operators, retailers and public authorities will fail to cooperate, and no viable economic models will be established for optimised urban goods delivery systems.

[11] Transport 2050: A new Mobility Paradigm

• Urban logistics systems will enable the efficient management of the movement of goods. • Sufficient public spending is available for the development and maintenance of the urban transport network as well as the provision of highly attractive public transport services.	

ANNEXE 2: Recent European Projects related to urban mobility

1. Projects awarded by DG TREN (now DG MOVE) and coordinated by UITP

1.1.SPUTNIC

SPUTNIC (or Strategies for Public Transport in Cities) has been an FP6 project of €2 million budget 100% financed by DG TREN coordinated by UITP (19 partners). It ended in July 2009.

The project aimed at supporting knowledge and experience transfer towards the New Member States and Candidate Countries by compiling existing knowledge and good practices. Practical tools including guidance materials and good practices have been collected and developed to support the PT stakeholders within four thematic areas:

- Market Organisation (financing/investment principles and priorities, revenue distribution system, incentives in contracts)
- Customer Relations (the image of PT, marketing and customer satisfaction)
- Equipment and Operational Aspects (infrastructure , rolling stock and related equipment, operational and fleet management)
- Corporate Management (human resource development, business organisation and planning including cost management)

More information can be found at: http://www.sputnicproject.eu/

1.2.COUNTERACT

COUNTERACT (Cluster Of User Networks in Transport and Energy Relating to Anti-terrorist ACTivities) was a 3-year DG TREN FP6 €3.5 million Co-ordinated Action project gathering 19 partners (see: http://www.counteract.eu/default.aspx).

The main objective of the project, which came to a close in Spring 2009, was to improve security against terrorist attacks aimed at public passenger transport, intermodal freight transport and energy production and transmission infrastructure.
UITP was project coordinator, and in particular coordinated the **Public Passenger transport Cluster** which aimed at providing practical tools and guidelines for public transport organisations to tackle security problems. The cluster was supported throughout the project by members of the UITP Security Commission (http://www.uitp.org/Public-Transport/security) and the COLPOFER platform (www.colpofer.org).
The following reports are the result of the work of the **Public Passenger Transport Cluster** (Click here to access the reports in UITP's e-library):

- PT1: Impact Assessment on "Rail and urban passenger transport security at the European Level regarding terrorist threats in railways and urban passenger transport"
- PT2: The Exchange of Security Policy Experience of Public Transport Operators
- PT3: Anti-terrorism Public Awareness Campaigns
- PT4: Generic Guidelines for Conducting Risk Assessment in Public Transport Networks
- PT5: Public transport Security Planning – Organisation, Countermeasures & Operations guidance
- PT7: Potential Terrorist Action – Decision-making
- PT9: Anti-terrorist Public Awareness Campaigns 2

NB: a CD-Rom including the inspirational material is available on request – contact: counteract@uitp.org

COUNTERACT is an input for the future DG ENTR project SECURE-ED

2. Other projects awarded by DG MOVE involving UITP: momo Car-Sharing

Momo **Car-Sharing** - More options for energy efficient mobility through Car-Sharing - is a 3-year FP7 project with a € 2.600.000 budget 100% granted by DG TREN. It has 15 partners among which UITP. It closed on September 2011.

Momo **Car-Sharing** objectives are built on the fact that the Car-Sharing services support less car-dependent mobility patterns, enabling more energy-efficient mobility and reducing the amount of cars in cities. The European potential is immense but far from being fully exploited. The following key objectives have been defined in order to overcome the existing obstacles:

- to increase the awareness of Car-Sharing in Europe
- to extend the number of Car-Sharers considerably
- to establish new services in locations without Car-Sharing
- to increase the energy-efficiency within the existing Car-Sharing operations
- to make recommendations on how to develop and establish eco-efficient Car-Sharing.

More information can be found at: http://www.momo-cs.ecolo-bremen.de/index.php

3. Other recent projects awarded by DG MOVE not involving UITP

LINK- The European forum on intermodal passenger travel - was a 3-year FP7 project granted by DG MOVE associating 17 partners from 13 countries in Europe (see: www.linkforum.eu). The final conference was held in March 2010 in Brussels at the Committee of the Regions.

The specific focus of LINK has been on long-distance and cross-border travelling.

The LINK recommendations on Passenger Intermodality are the result of Working Groups on the following thematic areas:

- WG1: Door-to-door information and ticketing
- WG2: Intermodal networks and interchanges
- WG3: Integration of long-distance transport and the "last urban mile"
- WG4: Planning and implementation
- WG5: Context conditions

The project produced 19 recommendations which can be found as "LINK. Recommendations and Strategies for Passenger Intermodality in Europe." at:
LINK recommendations at a glance (24 p./ 2.5 MB)

4. Projects awarded by DG RTD and coordinated by UITP

4.1.EURFORUM

See main report, clause 1.1.2

4.2.EBSF

EBSF, the European Bus System of the Future project, is a 4-year FP7 DG RTD Collaborative Project starting from 1st September 2008 and one of the largest surface transport R&D projects ever undertaken by the European Union with:

- a consortium of 47 partners
- a total budget of EUR 26 million (funds of 16 million).

EBSF is conceived as a driver to increase the attractiveness and raise the image of bus systems in urban areas, by means of developing new vehicles and infrastructure technologies in combination with operational best practices. The project will build upon state-of-the-art clean vehicular technologies and concentrate on improving the bus system as a whole. Six European cities will test and validate the project headways: Bremerhaven, Budapest, Gothenburg, Madrid, Rome and Rouen.

For more information, see: http://www.ebsf.eu/

5. Projects awarded by DG INFSO and coordinated by UITP: IFM-Project

IFM-Project (see: http://www.ifm-project.eu/) is a FP7 Support Action which started in February 2008 and ended in June 2010 (Budget €740,000). Coordinated by ITSO UK (with the support of TÜV Rheinland Consulting GmbH), it gathers - as main partners - specialists of ticketing issues from Germany (VDV Kernapplikations

GmbH & Co-KG (VDV-KA)), UK (ITSO and University of Newcastle), and France (RATP, SNCF, PREDIM/URBA 2000, University of Paris-Ouest La Défense), as well as UITP.

IFM-Project was built on a vision according to which there is a growing expectation across the European Community that interoperable smartcards will significantly lower the barriers to mobility, encourage social inclusion, and encourage the use of public rather than private transport.

IFM-Project was supported by an EU-IFM Forum set up by UITP on the basis of a Focus paper "Everybody Local Everywhere" produced by UITP in 2007 on the future of smartcards in transport. **The UITP and the EU-IFM Forum are committed to supporting an action plan for ICT in smart ticketing and supporting the urban / suburban / regional Mobility Action Plan**.

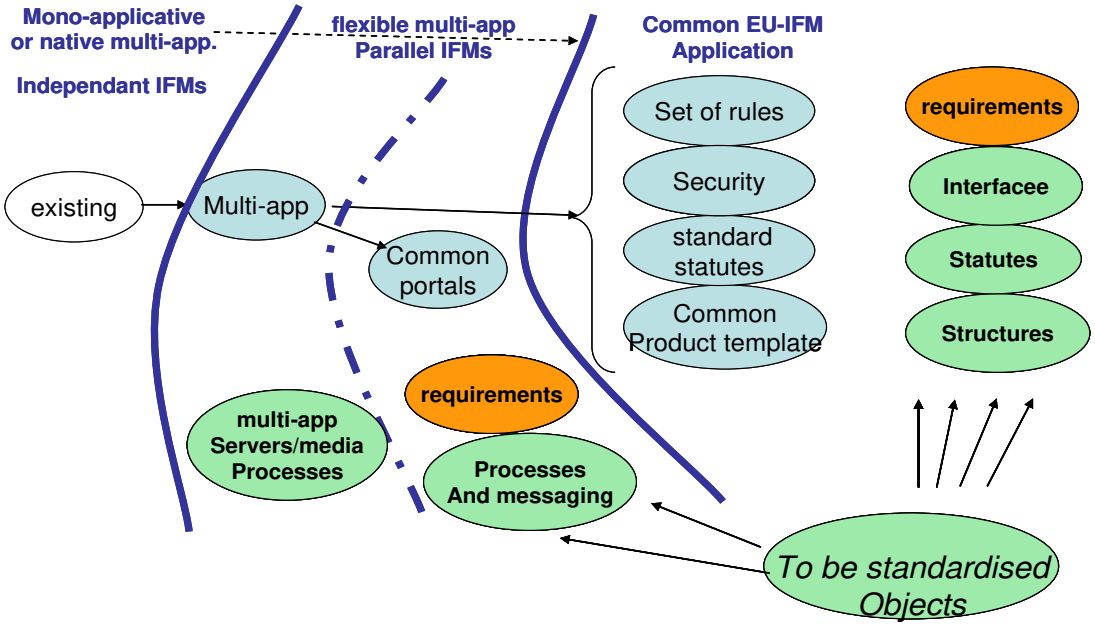
The aim of IFM-Project was to ensure cross-border interoperability of transport smart ticketing by removing the obstacles for the customer to switching transport modes.

The project was organised in five "thematic" work packages:

- Media
- Organisation
- Privacy (Common privacy charter and Common rules to define "privacy by design" systems)
- Trust
- Back-office Functions

The leading IFM organisations have built a shared vision to:

- Create an EU-IFM network to provide direction, coordination, networking of best practices and implementation planning of pan- European IFMS initiatives.
- Promote further European Standards for transport smartcards including Security and Certification equipment.
- Develop a multi-application solution to interoperable ticketing that can be implemented by steps (see diagram below).



Even if the ultimate solution appears to be a common EU-Application, Multi-application is the first step in the roadmap to interoperability.

All local schemes will one day, at their own pace, migrate to the next technical level. There is the opportunity to prepare a unique standard application for them to adopt at this time at reasonable modification costs.

The discussions in the IFM Forum (WP6 of the project) confirmed that this vision is commercially and technically feasible, and politically acceptable.

The development of multi-application Interoperable Fare Management encompasses the following actions:

- Continued operation of the IFM Forum
- Participation in the EU IFM Alliance Technical steps
- Technical steps: independent applications, then EU-Application
- Products agreements
- Retail agreements

IFM-Project has defined a global road map along two tracks:

- Priority Lane for quick wins:
  - Establish funding of an EU-IFM Alliance aiming to short term objectives
  - Interoperability through common multi-application processes on a single media
  - Common portal for remotely loading local applications
  - Updating and harmonisation of current CEN Standards to support EU-IFM
  - Create Pilot operation in a number of Member States

- Long Haul towards long term vision:
    - Establish funding of the EU-IFM Alliance aiming to long term objectives
    - develop a Common EU-IFM Application and Common Product Templates, and develop a commercial and technical framework for the sales and settlement of EU-IFM Products
    - Extend functionalities to facilitate inter-modality between road and rail, and support for Demand Management for all transport modes (urban, suburban, regional and inter-urban)
    - Engage and merge with existing IFM Systems and other transport modes (including private): e.g. road tolling, bicycle hire, parking, air, ferry
    - Extend to non-transport applications and market external to EU

An Action List includes all necessary actions to achieve the priority lane and initialise the first implementation of the EU-IFM initiative, as well as the preparatory standardisation work necessary for achieving the long term vision:

- Gain Support and Funding from European Commission:
    - Maintain and develop CEN Standards for implementing IFM (see diagram below)
    - Constitute an operating Interoperable Fare Management Scheme pilot, test, validate and roll-out as the "IFM2 project of the IFM initiative"
- Long Haul implementation Actions:
    - .Establishment of the needs, the standards and the first basis of organisation
    - Funding to be determined and organised by the established EU-IFM Alliance
- Development of EU- Interface
- Development of EU-IFM Application
- Creation of EU-IFM Application Organisation
- Creation of EU- IFM Products

The market uptake of the IFM-Project outcomes clearly requires support and funding from the European Commission (DG MOVE?) in order to allow for both:

- ***the development of necessary CEN standards***
- ***the launch of a Pilot test action showing that interoperability of ticketing systems can be achieved in a very few years***

ANNEX 3: URBAN MOBILITY QUESTIONNAIRE

Date:
Organisation:
Name:

What are the research priorities targeting Urban Mobility?
(source: EURFORUM)

At the end of every topic, you are invited to describe any suggestion you propose in the line : "Any suggestion?"

Major components	Topics	Research actions	Research priority (1 to 5)	Does your company wish to be involved in the research? (Y/N)	If yes, at what level?			Comments
					leading	partner	user group	
1. User Needs and Behaviour (p. 24)	1.1. Better understanding of the mobility behaviour of individuals and firms (p.24)	1.1.1. Better understanding of social determinants of mobility behaviour (p.24)						
		1.1.2. Mobility behaviour (p.24/25)						
		1.1.3. Better understanding of temporal and spatial planning processes of humans (p.25)						
		1.1.4. Better understanding the behaviour of shippers and freight transport service providers in the context of their business activities (p.25)						
		1.1.5. Better understanding freight transport on the level of the operating						

		humans (p.25)						
		1.1.6. The user's willingness to pay for urban freight and passenger transport services (p.25)						
		Any suggestion?						
	1.2. Improving the accessibility and sustainability of our cities (p.25)	1.2.1. Development of an accepted method and identification of standard indicators to determine realised access (p.25)						
		1.2.2. Observation and evaluation of realized levels of access and associated costs for this access (p.25)						
		Any suggestion?						
	1.3. Knowing the user: market research (p.25)	1.3.1. Better knowledge of the Public Transport user (p.25)						
		1.3.2. Perception of safety and security (p.26)						
		1.3.3. More participatory approach to the user demands (p.26)						
		Any suggestion?						
	1.4. Impact of policy measures and system innovations on mobility behaviour (p.26)	1.4.1. Impact of new information and payment services on mobility behaviour (p.26)						
		1.4.2. Obtaining estimates of adjustment costs related to behavioural changes (p.26)						
		1.4.3. Assessment of current hard and soft measures for the improvement of demand management (p.26)						
		Any suggestion?						

	1.5. Impact of societal changes on mobility behaviour (p.26)	1.5.1. The impacts of future societal changes in cities on the demand for passenger transport (p.26/27)						
		1.5.2. The influence of population and behavioural changes on goods consumption and freight transport demand (p.27)						
		1.5.3. The gap between the security issue as seen by the institutional actors and the security issue as perceived by the public (p.27)						
		1.5.4. Behaviour and travel patterns according to age and to activity (p.27)						
		1.5.5. Links between (perceived) safety of the mobility system and mobility choices (p.27)						
		Any suggestion?						
	1.6. How to actively influence user behaviour (p.27)	1.6.1. The relationship between the exact presentation of information and promotion on transport and mobility options, and the behaviour of users and non-users (p.27)						
		1.6.2. The distinction in behavioural impacts between “pulling” (e.g. incentives, promotion) and “pushing” (restrictions, legal requirements, road-charging (p.27)						
		1.6.3. How can new city logistics concepts best be presented in order that individual carriers cooperate? (p.27)						
		Any suggestion?						
	1.7. User acceptance analyses (p.27)	1.7.1.How to combine road pricing with other measures (parking policies, changes in infrastructure, stimulating						

		flexible working hours, pricing of public transport, reserved lanes and prioritization measures for PT, gratification of “low emission behaviour”)? (p.27/28)						
		1.7.2. How to increase acceptance of pricing policies? (p.28)						
		1.7.3. Multimodal passenger transport concepts (p.28)						
		1.7.4. Technological solutions (p.28)						
		1.7.5. Speed management (p.28)						
		Any suggestion?						
2. Urban Structure (p.29)	2.1. Analysis and assessment of interactions between urban land use and transport (p.30)	2.1.1. Better understanding of influences which determine people's and firms' choice of location (p.30)						
		2.1.2. Evaluation of impacts of different travel modes on space consumption (p.30)						
		Any suggestion?						
	2.2. Making land development more sustainable through more efficient taxation (p.30)	2.2.1. Development of methodologies on how to estimate land value (p.31)						
		2.2.2. Quantifying the individual contribution of publicly provided goods (in particular transport infrastructures and services) to the value of a property (p.31)						
		2.2.3. Identification of needed changes in the legal framework to implement land value capture (p.31)						
		2.2.4. Measures on how to overcome resistance in regards to						

		implementation of land value capture (p.31)						
		Any suggestion?						
	2.3. More efficient use of existing transport infrastructure	2.3.1. How to make better use of existing transport infrastructure (esp. road infrastructure) (p.31)						
		2.3.2. How to set incentives for a more space-efficient use of transport, how land use planning can contribute best (p.31)						
		Any suggestion?						
	2.4. Developing approaches for integrated planning (p.31)	2.4.1. Advanced models integrating land-use, transport and environment (p.31)						
		2.4.2. Development of easy-to-use decision support tools which can help local authorities to assess the possible impact of broad integrated policy packages within sustainable urban transport planning (p.31)						
		2.4.3. Development of adequate policies to direct locations of new housing and urban activities in more consistency with sustainability goals (p.32)						
		2.4.4. Development of procedures for systematic transport impact assessment of new land uses in order to enable promotion of better integrated locations (p.32)						
		2.4.5. Systematic analyses of the advantages and disadvantages of different institutional settings and ways of horizontal and vertical co-ordination in land use and transport						

		planning (p.32)						
		Any suggestion?						
	2.5. Fostering the use of integrated planning approaches (p.32)	2.5.1. Analysis of training needs and development of further training programmes for professionals across Europe for a better understanding of urban planning objectives and processes (p.32)						
		2.5.2. Further guidance on the integration of land use and transport planning concerning non-institutionalised ways of cooperation, participation and flexible planning processes to develop strategies for improving consensus building and acceptance of solutions while speeding up planning processes (PILOT) (p.32)						
		2.5.3. Incentives and support for consistent implementation of municipal environmental plans integrated with other plans impacting the urban development (LIVEABLE CITIES) (p.32)						
		Any suggestion?						
3. Mobility Services (p.33)	3.1. Towards seamless multimodal transport (p.34)	3.1.1. Information and payment services for different modes (p.34)						
		3.1.2. Positioning systems for cyclists and pedestrians (p.34)						
		3.1.3. Compilation and dissemination of good practices for demand responsive transport schemes to supplement transport services either						

		for targeted groups or in non dense areas (p.34)						
		3.1.4. Quiet night delivery, IT and communication systems for trip planning and customer information (p.35)						
		3.1.5. Systems that provide real-time information on the location of the vehicles in the freight transport chain (p.35)						
		3.1.6. Possibility to link services for passenger transport with logistics (p.35)						
		Any suggestion?						
	3.2. Compatible urban mobility services (p.35)	3.2.1. Standards for interregional interoperability of urban mobility services / 'white spots' (p.35)						
		3.2.2. Clear, concise and readable signage in public transport networks and their surroundings (p.35)						
		3.2.3. Integration of car and bike sharing in the urban transport system (p.35)						
		Any suggestion?						
	3.3. Customisation of services (p.35)	3.3.1. How to translate the needs of different user groups into functional service requirements, so that those services can be tailored to the user's needs (p.36)						
		3.3.2. How to personalize services in a customer-friendly way, without too much hassle for the user when providing personal data (p.36)						
		3.3.3. How to integrate location-based services in the service supply (p.36)						

		3.3.4. How to sufficiently protect the privacy of users of personalised systems (p.36)						
		3.3.5. E-ticketing and fare management systems (p.36)						
		3.3.6. The impact and opportunity of developing further charging schemes (p.36)						
		Any suggestion?						
	3.4. Development of sound business models and organisational frameworks (p.36)	3.4.1. Development of organisational schemes that enable entrepreneurship in service provision and encourage intermodal and interregional cooperation (p.36)						
		3.4.2. Conditions of coordination and cooperation of actors, including the travellers, in these matters (p.36)						
		3.4.3. Sustainable business cases both for future mobility services and network management systems (p.36)						
		3.4.4. Understanding the costs of different systems to determine the feasibility of future pricing systems (p.37)						
		3.4.5. Who bears the responsibilities of implementing pricing reforms and deciding on the utilization of possible revenues, and how coordination could best be ensured should these responsibilities not reside with the same institutions (IMPRINT NET) (p.37)						
		Any suggestion?						
	3.5. Technical issues (p.37)	3.5.1. Development of tools that to use real-time traffic and travel						

		information data for dynamic/intelligent network management (p.37)						
		3.5.2. Development of new technical standards for ticketing, information integration, charging systems and satellite positioning applications as well as research on the interoperability of systems and policies (p.37)						
		3.5.3. Improving data collection on congestion and the environmental situation (p.37)						
		Any suggestion?						
4. Integrated Systems (p.38)	4.1. Reducing negative impacts of urban transport (p.39)	4.1.1. Urban road safety: taking into account the mix of transport modes (p.39)						
		4.1.2. Improving the security of transport systems (p.40)						
		4.1.3. Clean and silent vehicles for an environment-friendly urban mobility (p.40)						
		Any suggestion?						
	4.2. Towards integrated urban transport networks (p.41)	4.2.1. Sharing infrastructures (p.41)						
		4.2.2. Funding urban transport (p.42)						
		4.2.3. From interchanges to intermodality (p.42)						
		4.2.4. Towards intelligent integrated network management (p.42/43)						
		Any suggestion?						

	4.3. Implementation of new urban freight concepts (p.43)	4.3.1. Methods for raising problem awareness and influencing the willingness of all actors to support the implementation of new city-logistic-concepts (p.43)						
		4.3.2. Development of new techniques for the transport on the last kilometres and introduction of more city friendly vehicles such as small electric or hybrid vehicles (p.43)						
		4.3.3. Effects of societal changes in cities on commercial and freight transport (p.43)						
		4.3.4. Development of intelligent agent-based technologies (p.43)						
		4.3.5. Definition of an optimum between the benefits of certain technical alternatives (like underground delivery) and their costs (p.43)						
		4.3.6. Environmental aspects (noise, pollution, energy use) related to urban freight transport (p.43)						
		4.3.7. Harmonisation of legislation on freight delivery (p.44)						
		Any suggestion?						
	4.4. Strengthening of the alternatives for the private car (p.44)	4.4.1. Pedestrians and cyclists (p.44)						
		4.4.2. Public transport operation: better data for improved operation (p.44)						
		4.4.3. Taxis and alternative modes: towards less cars, more occupied (p.45)						

		4.4.4. Organisational and regulatory framework for urban transport (p.45/46)						
		4.4.5. Innovations in public transport infrastructure and rolling stock (p.46)						
		Any suggestion?						
5. Urban Transport Demand Analysis And Modelling For Policy Support (p.47)	5.1. Improvement of data collection on the issue of passenger transport (p.47)							
	5.2. Improvement of data collection on the issue of urban freight transport through joint efforts (p.48)							
	5.3. Standardisation of survey design and indicators for urban passenger and freight transport (p.48)							
	5.4. Improving methods like data fusion and synthetic matching (p.48/49)							
	5.5. Improving complementary data collection and reliability of data (p.49)							
	5.6. Strengthening our understanding of user aspects by modelling user behaviour (p.49)							
	5.7. Improvement of transport models integrating all fields of urban planning and management (p.50)							
	5.8. Reduction of barriers for practical use of up-to-date models (p.50/51)							
	5.9. Improvement of urban freight transport models and support of their application (p.51)							
	Any suggestion?							

ANNEX 4: URBAN MOBILITY QUESTIONNAIRE RESULTS

What are the research priorities targeting Urban Mobility?
(source: Strategic Research Agenda EURFORUM)

Sources for priorities: 27 answers to relevant UITP questionnaire

High priorities are in green when below 2.2 and in yellow when below 2.5 (highest priority is 1, lower is 5)
Some priorities higher than 2.5 are presented when number of potential participants as leader or partner is higher than 5 (highlighted in brown)
Other results are presented on the files providing all the answers to the relevant questionnaire

Major compo-nents	Topics	Research actions	Research Action Number	*Average priority (A)*	Number of potential participants			Answers from supply industry					Answers from operators					Answers from organising authorities					Answers from consultants/academics				
					Leader (L)	Partner (P)	User group (U)	Number	*Priority*	Participation			Number	*Priority*	Participation			Number	*Priority*	Participation			Number	*Priority*	Participation		
								N	*A*	L	P	U	N	*A*	L	P	U	N	*A*	L	P	U	N	*A*	L	P	U
1. User Needs and Behaviour (p. 24)	1.1. Better understanding of the mobility behaviour of individuals and firms (p.24)	1.1.1. Better understanding of social determinants of mobility behaviour (p.24)	1.1.1	***2.3***	2	4	2	3	***2.3***				6	***1.8***		2	1	7	***2.4***			2	5	***2.6***	2	2	
		1.1.2. Mobility behaviour (p.24/25)	1.1.2	***2***	2	5	3	3	***2.3***				6	***1.7***		3		7	***1.9***			3	5	***2.2***	2	2	
	1.3. Knowing the user: market research	1.3.1. Better knowledge of the Public Transport user (p.25)	1.3.1	***2.1***	1	8	2	3	***3***				4	***1.8***		3		8	***1.6***		3	2	5	***2.6***	1	2	

	(p.25)	1.3.3. More participatory approach to the user demands (p.26)	1.3.3	***2.4***	1	5	2	3	***3***				4	***2***		2	1	7	***2.1***		1	1	5	***2.8***	1	2	
	1.4. Impact of policy measures and system innovations on mobility behaviour (p.26)	1.4.1. Impact of new information and payment services on mobility behaviour (p.26)	1.4.1	***2***	1	8	1	3	***2.7***				5	***1.4***		3		8	***2***		2	1	5	***2.4***	1	2	
		1.4.3. Assessment of current hard and soft measures for the improvement of demand management (p.26)	1.4.3	***2.5***	1	6	4	3	***3***				4	***2.3***		2	1	8	***2.3***		2	3	5	***2.6***	1	2	
	1.5. Impact of societal changes on mobility behaviour (p.26)	1.5.1. The impacts of future societal changes in cities on the demand for passenger transport (p.26/27)	1.5.1	***1.9***	2	5	1	3	***2.7***			1	6	***1.7***		2		7	***1.9***		2		5	***1.8***	2	1	
		1.5.4. Behaviour and travel patterns according to age and to activity (p.27)	1.5.4	***2***	2	5	1	3	***2.3***				5	***1.6***		2		7	***2***		2	1	5	***2***	2	1	
		1.5.5. Links between (perceived) safety of the mobility system and mobility choices (p.27)	1.5.5	***2.5***	1	4	1	3	***2.3***				5	***2***		1	1	8	***3***		1		5	***2.2***	1	2	
	1.6. How to actively influence	1.6.1. The relationship between the	1.6.1	***2.4***	2	7	3	3	***2.7***				4	***3.5***		2		8	***2***		3	3	5	***1.8***	2	2	

	user behaviour (p.27)	exact presentation of information and promotion on transport and mobility options, and the behaviour of users and non-users (p.27)																									
		1.6.2. The distinction in behavioural impacts between “pulling” (e.g. incentives, promotion) and “pushing” (restrictions, legal requirements, road-charging (p.27)	1.6.2	***2.4***	1	3	2	3	***3***				5	***2.6***		1		8	***2.3***			2	5	***2.2***	1	2	
	1.7. User acceptance analyses (p.27)	1.7.3. Multimodal passenger transport concepts (p.28)	1.7.3	***1.8***	1	7	5	3	***2***				4	***1.5***		1		7	***2.1***		2	3	5	***1.6***	1	3	1
		1.7.4. Technological solutions (p.28)	1.7.4	***2.5***	1	5	4	3	***2.3***			1	4	***1.5***		2	1	7	***3***			2	5	***2.6***	1	3	
2. Urban Structure (p.29)	2.3. More efficient use of existing transport infrastructure	2.3.1. How to make better use of existing transport infrastructure (esp. road infrastructure) (p.31)	2.3.1	***2.7***	1	5	2	3	***2.7***				5	***2.6***		1	1	7	***2.4***		2	1	5	***3***	1	2	
		2.3.2. How to set incentives for a more space-efficient use of transport, how	2.3.2	***2.5***	1	4	3	3	***2.7***				5	***2.6***		1	2	7	***2.3***		1	1	5	***2.4***	1	2	

		land use planning can contribute best (p.31)																									
		2.4.1. Advanced models integrating land-use, transport and environment (p.31)	2.4.1	***2.5***	1	4	3	3	***3.3***				6	***2.5***		2	1	7	***2.3***			2	5	***2.4***	1	2	
	2.4. Developing approaches for integrated planning (p.31)	2.4.2. Development of easy-to-use decision support tools which can help local authorities to assess the possible impact of broad integrated policy packages within sustainable urban transport planning (p.31)	2.4.2	***2.5***	1	3	5	3	***2.7***				5	***3***		1	2	7	***2.1***			3	5	***2.4***	1	2	
		3.1.1. Information and payment services for different modes (p.34)	3.1.1	***2.3***	2	11	1	3	***2.3***				6	***2.3***		4		8	***2.9***		3	1	6	***1.5***	2	4	
3. Mobility Services (p.33)	3.1. Towards seamless multimodal transport (p.34)	3.1.2. Positioning systems for cyclists and pedestrians (p.34)	3.1.2	***2.5***	2	6	2	3	***2.7***				6	***2***			2	8	***3***		1		6	***2.2***	2	5	
		3.1.4. Quiet night delivery, IT and communication systems for trip planning and customer	3.1.4	***2.6***	2	6	3	3	***2.7***			1	7	***2.6***		3		8	***2.9***			2	6	***2.3***	2	3	

	information (p.35)																								
3.2. Compatible urban mobility services (p.35)	3.2.1. Standards for interregional interoperability of urban mobility services / 'white spots' (p.35)	3.2.1	***2.5***	1	3	4	3	***1.7***				5	***2.8***		1	1	7	***2.6***			3	5	***2.6***	1	2	
	3.2.2. Clear, concise and readable signage in public transport networks and their surroundings (p.35)	3.2.2	***2.2***	1	6	4	3	***2.3***				5	***2***		2	1	7	***2.3***		1	2	5	***2.2***	1	3	1
	3.2.3. Integration of car and bike sharing in the urban transport system (p.35)	3.2.3	***2.4***	1	6	2	3	***3.3***				5	***1.8***		2	1	7	***2.7***		1	1	5	***2***	1	3	
3.3. Customisation of services (p.35)	3.3.1. How to translate the needs of different user groups into functional service requirements, so that those services can be tailored to the user's needs (p.36)	3.3.1	***2.3***	1	4	3	3	***3.3***				5	***2.4***		1	1	7	***1.9***		1	2	5	***2***	1	2	
	3.3.2. How to personalize services in a customer-friendly way, without too much hassle for the user when providing	3.3.2	***2.2***	1	4	3	3	***2.3***				5	***2.4***		1	2	7	***2***		1	1	5	***2.2***	1	2	

	personal data (p.36)																									
	3.3.4. How to sufficiently protect the privacy of users of personalised systems (p.36)	3.3.4	***2.4***	1	1	4	4	***2.3***			1	5	***2.6***			2	7	***2.1***			1	5	***2.8***	1	1	
	3.3.5. E-ticketing and fare management systems (p.36)	3.3.5	***2.4***	1	9	2	4	***2.8***		1		6	***2***		4		8	***2.4***	1	3	2	5	***2.6***		1	
	3.3.6. The impact and opportunity of developing further charging schemes (p.36)	3.3.6	***2.6***	1	5	2	4	***3***		1		5	***1.8***		2	1	7	***2.7***			1	5	***3***	1	2	
3.4. Development of sound business models and organisational frameworks (p.36)	3.4.3. Sustainable business cases both for future mobility services and network management systems (p.36)	3.4.3	***2.7***	1	5	2	3	***3***				7	***2.4***		4	1	7	***2.7***			1	5	***3***	1	1	
	3.4.4. Understanding the costs of different systems to determine the feasibility of future pricing systems (p.37)	3.4.4	***2.4***	1	5	1	3	***3.3***				6	***1.5***		4	1	7	***2.6***				5	***2.8***	1	1	
3.5. Technical issues (p.37)	3.5.1. Development of tools that to use real-time traffic and travel information data for dynamic/intellige	3.5.1	***2.1***		10	3	4	***2.8***		3	1	6	***1.5***		2	1	8	***2.3***		2	1	6	***2.2***		3	

		nt network management (p.37)																									
		3.5.2. Development of new technical standards for ticketing, information integration, charging systems and satellite positioning applications as well as research on the interoperability of systems and policies (p.37)	3.5.2	***2.3***	1	9	1	4	***2.8***		2		6	***1.8***		3	1	8	***2.6***	1	1		6	***2***		3	
		3.5.3. Improving data collection on congestion and the environmental situation (p.37)	3.5.3	***2.5***	2	6	2	3	***3***		1		5	***2***		2	1	7	***2.7***	2	1		5	***2.4***	2	1	
4. Integrated Systems (p.38)	4.1. Reducing negative impacts of urban transport (p.39)	4.1.1. Urban road safety: taking into account the mix of transport modes (p.39)	4.1.1	***2.5***	1	5	2	3	***2.3***				5	***2***		1	1	7	***2.9***		2	1	5	***2.6***	1	2	
		4.1.2. Improving the security of transport systems (p.40)	4.1.2	***2.5***	2	4	5	5	***2.8***	1	1	2	5	***1.8***		1	2	7	***2.6***		1	1	5	***2.8***	1	1	
		4.1.3. Clean and silent vehicles for an environment-friendly urban mobility (p.40)	4.1.3	***2.4***	2	7	2	4	***2***	1	2	1	6	***1.5***	1	2	1	7	***3***		1		5	***2.8***		2	

5. Urban Transport Demand Analysis And Modelling For Policy Support (p.47)	4.2. Towards integrated urban transport networks (p.41)	4.2.3. From interchanges to intermodality (p.42)	4.2.3	***2***	1	6	4	3	***2***				5	***2.2***		3		7	***1.9***			3	6	***2.2***	1	3	1
		4.2.4. Towards intelligent integrated network management (p.42/43)	4.2.4	***2.1***	1	8	1	4	***2***		2		5	***2***		3		7	***2.3***		2	1	5	***2.2***	1	1	
	4.4. Strengthening of the alternatives for the private car (p.44)	4.4.1. Pedestrians and cyclists (p.44)	4.4.1	***2.5***	2	2	4	2	***1***				5	***2.8***			3	8	***2.6***			1	5	***2.6***	2	2	
		4.4.2. Public transport operation: better data for improved operation (p.44)	4.4.2	***2.2***	1	7	3	2	***1.5***				6	***2.3***		3		7	***1.9***		2	3	5	***2.8***	1	2	
		4.4.5. Innovations in public transport infrastructure and rolling stock (p.46)	4.4.5	***2.1***	1	6	2	2	***1.5***				5	***2.2***		2	1	6	***1.7***		1	1	5	***2.6***	1	2	
	5.1. Improvement of data collection on the issue of passenger transport (p.47)		5.1	***2.3***	4	7	4	3	***3.7***			1	5	***1.6***		3		7	***1.7***	2	2	3	5	***2.8***	2	2	
	5.6. Strengthening our understanding of user aspects by modelling user behaviour (p.49)		5.6	***2.4***	2	6	2	3	***2.7***				5	***2.2***		2		7	***2.6***		2	2	5	***2.2***	2	2	

ANNEX 5: FP7 CALLS IN URBAN MOBILITY

Major compo-nents	Topics	Research actions	Previous calls				
			2008	2009 (no call)	2010	2011	2012
1. User Needs and Behavio ur (p. 24)	1.1. Better understand ing of the mobility behaviour of individuals and firms (p.24)	1.1.1. Better understanding of social determinants of mobility behaviour (p.24)	SST 2008 67 / TPT 2008 6		TPT 2010 1 / TPT 2010 5	TPT 2011 1-2 / TPT 2011 2-1	
		1.1.2. Mobility behaviour (p.24/25)			TPT 2010 1 / TPT 2010 5	TPT 2011 1-2 / TPT 2011 2-1	
		1.1.3. Better understanding of temporal and spatial planning processes of humans (p.25)			TPT 2010 1 / TPT 2010 5	TPT 2011 1-2 / TPT 2011 2-1	
		1.1.4. Better understanding the behaviour of shippers and freight transport service providers in the context of their business activities (p.25)			TPT 2010 1 / TPT 2010 5		
		1.1.5. Better understanding freight transport on the level of the operating humans (p.25)			TPT 2010 1 / TPT 2010 5		
		1.1.6. The user's willingness to pay for urban freight and passenger transport services (p.25)			TPT 2010 1 / TPT 2010 5		
	1.2. Improving the accessibilit y and sustainabili ty of our	1.2.1. Development of an accepted method and identification of standard indicators to determine realised access (p.25)					
		1.2.2. Observation and evaluation of realized levels of access and associated costs for this access (p.25)					

	cities (p.25)						
	1.3. Knowing the user: market research (p.25)	1.3.1. Better knowledge of the Public Transport user (p.25)	TPT 2008 6			TPT 2011 1-2 / TPT 2011 2-1	
		1.3.2. Perception of safety and security (p.26)	SST 2008 411			TPT 2011 1-2	
		1.3.3. More participatory approach to the user demands (p.26)	SST 2008 412				
	1.4. Impact of policy measures and system innovations on mobility behaviour (p.26)	1.4.1. Impact of new information and payment services on mobility behaviour (p.26)			SST 2010 13-2	TPT 2011 1-2 / TPT 2011 2-1	
		1.4.2. Obtaining estimates of adjustment costs related to behavioural changes (p.26)			SST 2010 13-2		
		1.4.3. Assessment of current hard and soft measures for the improvement of demand management (p.26)	TPT 2008 3 / TPT 2008 6		SST 2010 13-2 / TPT 2010 5		
	1.5. Impact of societal changes on mobility behaviour (p.26)	1.5.1. The impacts of future societal changes in cities on the demand for passenger transport (p.26/27)	TPT 2008 10		TPT 2010 1 / TPT 2010 3	TPT 2011 1-2	
		1.5.2. The influence of population and behavioural changes on goods consumption and freight transport demand (p.27)	TPT 2008 10		TPT 2010 1 / TPT 2010 3		
		1.5.3. The gap between the security issue as seen by the institutional actors and the security issue as perceived by the public (p.27)					
		1.5.4. Behaviour and travel patterns according to age and to activity (p.27)	SST 2008 67		TPT 2010 1 / TPT 2010 5	TPT 2011 1-2	
		1.5.5. Links between (perceived) safety of the mobility system and mobility choices (p.27)	SST 2008 411 / SST 2008 412			TPT 2011 2-2	
	1.6. How to actively influence user behaviour (p.27)	1.6.1. The relationship between the exact presentation of information and promotion on transport and mobility options, and the behaviour of users and non-users (p.27)				TPT 2011 1-2 / TPT 2011 2-1	
		1.6.2. The distinction in behavioural impacts between “pulling” (e.g. incentives, promotion) and “pushing” (restrictions, legal requirements, road-charging (p.27)					

		1.6.3. How can new city logistics concepts best be presented in order that individual carriers cooperate? (p.27)	TPT 2008 3				
	1.7. User acceptance analyses (p.27)	1.7.1.How to combine road pricing with other measures (parking policies, changes in infrastructure, stimulating flexible working hours, pricing of public transport, reserved lanes and prioritization measures for PT, gratification of “low emission behaviour”)? (p.27/28)			SST 2010 13-2 / TPT 2010 1		
		1.7.2. How to increase acceptance of pricing policies? (p.28)			SST 2010 13-2 / TPT 2010 1		
		1.7.3. Multimodal passenger transport concepts (p.28)	TPT 2008 6		SST 2010 13-2 / TPT 2010 1 / TPT 2010 5	TPT 2011 2-1	
		1.7.4. Technological solutions (p.28)	SST 2008 412 / TPT 2008 6		TPT 2010 1		
		1.7.5. Speed management (p.28)					
2. Urban Structure (p.29)	2.1. Analysis and assessment of interactions between urban land use and transport (p.30)	2.1.1. Better understanding of influences which determine people's and firms' choice of location (p.30)	TPT 2008 10		TPT 2010 1 / TPT 2010 3	TPT 2011 1-1	
		2.1.2. Evaluation of impacts of different travel modes on space consumption (p.30)					
	2.2. Making land development more sustainable through	2.2.1. Development of methodologies on how to estimate land value (p.31)					
		2.2.2. Quantifying the individual contribution of publicly provided goods (in particular transport infrastructures and services) to the value of a property (p.31)					
		2.2.3. Identification of needed changes in the legal framework to implement land value capture (p.31)					

	more efficient taxation (p.30)	2.2.4. Measures on how to overcome resistance in regards to implementation of land value capture (p.31)					
	2.3. More efficient use of existing transport infrastructure	2.3.1. How to make better use of existing transport infrastructure (esp. road infrastructure) (p.31)	TPT 2008 1		TPT 2010 4 / TPT 2010 5	TPT 2011 1-1	TPT 2012 2-2
		2.3.2. How to set incentives for a more space-efficient use of transport, how land use planning can contribute best (p.31)			SST 2010 13-2 / TPT 2010 5	TPT 2011 1-1	
	2.4. Developing approaches for integrated planning (p.31)	2.4.1. Advanced models integrating land-use, transport and environment (p.31)	SST 2008 312 / SST 2008 316 / TPT 2008 2 / TPT 2008 3 / TPT 2008 5 / TPT 2008 6		SST 2010 13-2 / TPT 2010 5	TPT 2011 1-1	
		2.4.2. Development of easy-to-use decision support tools which can help local authorities to assess the possible impact of broad integrated policy packages within sustainable urban transport planning (p.31)	SST 2008 271 / SST 2008 311 / SST 2008 312 / SST 2008 316 / TPT 2008 6			TPT 2011 1-1	
		2.4.3. Development of adequate policies to direct locations of new housing and urban activities in more consistency with sustainability goals (p.32)	SST 2008 311 / SST 2008 316		SST 2010 13-2	TPT 2011 1-1	
		2.4.4. Development of procedures for systematic transport impact assessment of new land uses in order to enable promotion of better integrated locations (p.32)	SST 2008 316		SST 2010 13-2	TPT 2011 1-1	
		2.4.5. Systematic analyses of the advantages and disadvantages of different institutional settings and ways of horizontal and vertical co-ordination in land use and transport planning (p.32)	SST 2008 316		SST 2010 13-2		
	2.5. Fostering	2.5.1. Analysis of training needs and development of further training programmes for professionals across Europe for a	SST 2008 316				

	the use of integrated planning approaches (p.32)	better understanding of urban planning objectives and processes (p.32)					
		2.5.2. Further guidance on the integration of land use and transport planning concerning non-institutionalised ways of cooperation, participation and flexible planning processes to develop strategies for improving consensus building and acceptance of solutions while speeding up planning processes (PILOT) (p.32)	SST 2008 316 / SST 2008 67				
		2.5.3. Incentives and support for consistent implementation of municipal environmental plans integrated with other plans impacting the urban development (LIVEABLE CITIES) (p.32)	SST 2008 316 / TPT 2008 2 / TPT 2008 5 / TPT 2008 6				
3. Mobility Services (p.33)	3.1. Towards seamless multimodal transport (p.34)	3.1.1. Information and payment services for different modes (p.34)	SST 2008 276 / SST 2008 311 / SST 2008 312 / TPT 2008 13			SST 2011 7-5	
		3.1.2. Positioning systems for cyclists and pedestrians (p.34)	SST 2008 312 / SST 2008 412				
		3.1.3. Compilation and dissemination of good practices for demand responsive transport schemes to supplement transport services either for targeted groups or in non dense areas (p.34)	SST 2008 311 / SST 2008 312 / SST 2008 317 / SST 2008 64 / SST 2008 67 / TPT 2008 3			SST 2011 7-5 SST 2011 34-1	
		3.1.4. Quiet night delivery, IT and communication systems for trip planning and customer information (p.35)	SST 2008 276 / SST 2008 312/ SST 2008 313			SST 2011 7-5	
		3.1.5. Systems that provide real-time information on the location of the vehicles in the freight transport chain (p.35)	SST 2008 276 / SST 2008 312/ SST 2008 313 / SST 2008 522				

		3.1.6. Possibility to link services for passenger transport with logistics (p.35)	SST 2008 312 / SST 2008 313			SST 2011 7-5	
	3.2. Compatible urban mobility services (p.35)	3.2.1. Standards for interregional interoperability of urban mobility services / 'white spots' (p.35)	TPT 2008 13				
		3.2.2. Clear, concise and readable signage in public transport networks and their surroundings (p.35)	SST 2008 412				
		3.2.3. Integration of car and bike sharing in the urban transport system (p.35)	SST 2008 412				
	3.3. Customisation of services (p.35)	3.3.1. How to translate the needs of different user groups into functional service requirements, so that those services can be tailored to the user's needs (p.36)	TPT 2008 3 / TPT 2008 13		TPT 2010 1	SST 2011 7-5	
		3.3.2. How to personalize services in a customer-friendly way, without too much hassle for the user when providing personal data (p.36)	SST 2208 311			SST 2011 7-5	
		3.3.3. How to integrate location-based services in the service supply (p.36)	SST 2208 311			SST 2011 7-5	
		3.3.4. How to sufficiently protect the privacy of users of personalised systems (p.36)	SST 2008 411 / SST 2008 412			SST 2011 7-5	
		3.3.5. E-ticketing and fare management systems (p.36)	SST 2008 276 / TPT 2008 13		TPT 2010 5	SST 2011 7-5	
		3.3.6. The impact and opportunity of developing further charging schemes (p.36)			SST 2010 13-2 / TPT 2010 5	SST 2011 7-5	
	3.4. Development of sound business models and organisational frameworks (p.36)	3.4.1. Development of organisational schemes that enable entrepreneurship in service provision and encourage intermodal and interregional cooperation (p.36)	SST 2008 317 / SST 2008 522 / TPT 2008 6 / TPT 2008 7 / TPT 2008 13		TPT 2010 4		
		3.4.2. Conditions of coordination and cooperation of actors, including the travellers, in these matters (p.36)	SST 2008 522 / TPT 2008 6 / TPT 2008 7 / TPT 2008 13		TPT 2010 4		TPT 2012 1-1

		3.4.3. Sustainable business cases both for future mobility services and network management systems (p.36)	SST 2008 511 / SST 2008 522 / TPT 2008 7 / TPT 2008 13		TPT 2010 4		
		3.4.4. Understanding the costs of different systems to determine the feasibility of future pricing systems (p.37)	SST 2008 271 / SST 2008 522		TPT 2010 4		
		3.4.5. Who bears the responsibilities of implementing pricing reforms and deciding on the utilization of possible revenues, and how coordination could best be ensured should these responsibilities not reside with the same institutions (IMPRINT NET) (p.37)	SST 2008 522				
	3.5. Technical issues (p.37)	3.5.1. Development of tools that to use real-time traffic and travel information data for dynamic/intelligent network management (p.37)	SST 2008 276 / SST 2008 311 / SST 2008 312 / SST 2008 316 / SST 2008 522 / TPT 2008 6 / TPT 2008 13			SST 2011 7-5	TPT 2012 2-2
		3.5.2. Development of new technical standards for ticketing, information integration, charging systems and satellite positioning applications as well as research on the interoperability of systems and policies (p.37)	SST 2008 276 / SST 2008 312 / SST 2008 522 / TPT 2008 13			SST 2011 7-5	
		3.5.3. Improving data collection on congestion and the environmental situation (p.37)	SST 2008 312 / TPT 2008 2 / TPT 2008 5		TPT 2010 7 / TPT 2010 11		TPT 2012 2-2
4. Integrated Systems (p.38)	4.1. Reducing negative impacts of urban	4.1.1. Urban road safety: taking into account the mix of transport modes (p.39)	SST 2008 411 / SST 2008 413 / TPT 2008 6		SST 2010 41-1		
		4.1.2. Improving the security of transport systems (p.40)	SST 2008 411		SST 2010 41-1		TPT 2012 2-2

	transport (p.39)	4.1.3. Clean and silent vehicles for an environment-friendly urban mobility (p.40)	SST 2008 315 / TPT 2008 2 / TPT 2008 3 / TPT 2008 5		SST 2010 11-3 / TPT 2010 7/ TPT 2010 11		
	4.2. Towards integrated urban transport networks (p.41)	4.2.1. Sharing infrastructures (p.41)	SST 2008 413		SST 2010 13-2 / TPT 2010 4		
		4.2.2. Funding urban transport (p.42)	SST 2008 413		SST 2010 13-2 / TPT 2010 4		
		4.2.3. From interchanges to intermodality (p.42)	SST 2008 312 / SST 2008 413 / TPT 2008 13		SST 2010 13-2		
		4.2.4. Towards intelligent integrated network management (p.42/43)	SST 2008 312 / SST 2008 412 / SST 2008 413 / SST 2008 522 / TPT 2008 5 / TPT 2008 6 / TPT 2008 13		SST 2010 13-2 / TPT 2010 4 / TPT 2010 7		TPT 2012 2-2
	4.3. Implement ation of new urban freight concepts (p.43)	4.3.1. Methods for raising problem awareness and influencing the willingness of all actors to support the implementation of new city-logistic-concepts (p.43)	SST 2208 311 / SST 2008 313 / SST 2008 314 / TPT 2008 3 / TPT 2008 7 / TPT 2008 13		SST 2010 1 3-2	SST 2011 11-1 / SST 2011 11-2 / SST 2011 11-3 / SST 2011 11-4 / SST 2011 21-1 / TPT 2011 1-3	
		4.3.2. Development of new techniques for the transport on the last kilometres and introduction of more city friendly vehicles such as small electric or hybrid vehicles (p.43)	SST 2208 311 / SST 2008 313 / SST 2008 314 / SST 2008 315 / TPT 2008 6 / TPT 2008 7 / TPT 2008 13		SST 2010 13-2		

		4.3.3. Effects of societal changes in cities on commercial and freight transport (p.43)	SST 2008 314		SST 2010 13-2 / TPT 2010 1		
		4.3.4. Development of intelligent agent-based technologies (p.43)	SST 2008 314 / TPT 2008 3				
		4.3.5. Definition of an optimum between the benefits of certain technical alternatives (like underground delivery) and their costs (p.43)	SST 2008 313 / SST 2008 314				
		4.3.6. Environmental aspects (noise, pollution, energy use) related to urban freight transport (p.43)	SST 2008 313 / SST 2008 314 / TPT 2008 2/ TPT 2008 3		TPT 2010 7		TPT 2012 2-2
		4.3.7. Harmonisation of legislation on freight delivery (p.44)	SST 2008 314				
	4.4. Strengthening of the alternatives for the private car (p.44)	4.4.1. Pedestrians and cyclists (p.44)	SST 2008 312 / SST 2008 412				
		4.4.2. Public transport operation: better data for improved operation (p.44)	SST 2008 312 / TPT 2008 1		TPT 2010 11		TPT 2012 2-2
		4.4.3. Taxis and alternative modes: towards less cars, more occupied (p.45)					
		4.4.4. Organisational and regulatory framework for urban transport (p.45/46)	SST 2008 413 / SST 2008 63 / TPT 2008 13				TPT 2012 1-1

		4.4.5. Innovations in public transport infrastructure and rolling stock (p.46)	SST 2008 273 / SST 2008 311 / SST 2008 411 / SST 2008 412 / SST 2008 413 / SST 2008 511 / SST 2008 521 / SST 2008 63 / TPT 2008 3 / TPT 2008 6 / TPT 2008 10		TPT 2010 3		
5. Urban Transport Demand Analysis And Modelling For Policy Support (p.47)	5.1. Improvement of data collection on the issue of passenger transport (p.47)		SST 2008 274 / SST 2008 312 / SST 2008 316 / SST 2008 421 / TPT 2008 1 / TPT 2008 2 / TPT 2008 3 / TPT 2008 5		SST 2010 13-1 / TPT 2010 11		TPT 2012 2-2
	5.2. Improvement of data collection on the issue of urban freight transport through joint efforts (p.48)		SST 2008 274 / SST 2008 275 / SST 2008 314 / SST 2008 316/ SST 2008 421 / TPT 2008 2/ TPT 2008 3/ TPT 2008 5		SST 2010 13-1 / TPT 2010 11	SST 2011 21-1	TPT 2012 2-2

	5.3. Standardisation of survey design and indicators for urban passenger and freight transport (p.48)	SST 2008 275 / SST 2008 312 / SST 2008 312 / SST 2008 314 / SST 2008 316 / SST 2008 413/ SST 2008 421 / TPT 2008 2 / TPT 2008 3		SST 2010 13-1		
	5.4. Improving methods like data fusion and synthetic matching (p.48/49)	*SST 2008 274* / SST 2008 312 / SST 2008 316 / SST 2008 413 / SST 2008 421		SST 2010 1 3-1		
	5.5. Improving complementary data collection and reliability of data (p.49)	SST 2008 274 / SST 2008 312 / SST 2008 316 / SST 2008 413 / SST 2008 421 / TPT 2008 1 / TPT 2008 2 / TPT 2008 3 / TPT 2008 5		SST 2010 1 3-1/ TPT 2010 11		TPT 2012 2-2
	5.6. Strengthening our understanding of user aspects by modelling user behaviour (p.49)	SST 2008 312 / SST 2008 316 / SST 2008 413 / SST 2008 421		SST 2010 13-1	TPT 2011 2-3	TPT 2012 2-2

	5.7. Improvement of transport models integrating all fields of urban planning and management (p.50)	SST 2008 421 / SST 2008 63 / SST 2008 67 / SST 2008 272 / SST 2008 274 / SST 2008 275 / SST 2008 276 / SST 2008 312 / SST 2008 316 / TPT 2008 2 / TPT 2008 3 / TPT 2008 5 / TPT 2008 6 / TPT 2008 8 / TPT 2008 13		SST 2010 13-1 / SST 2010 13-2 / TPT 2010 4 / TPT 2010 5		TPT 2012 1-4 / TPT 2012 2-1 / TPT 2012 2-2
	5.8. Reduction of barriers for practical use of up-to-date models (p.50/51)	SST 2008 421 / SST 2008 63 / SST 2008 67 / SST 2008 272 / SST 2008 274 / SST 2008 275 / SST 2008 276 / SST 2008 312 / SST 2008 316 / TPT 2008 1 / TPT 2008 2 / TPT 2008 3 / TPT 2008 5 / TPT 2008 6 / TPT 2008 8 / TPT 2008 13		SST 2010 13-1		TPT 2012 2-2

	5.9. Improvement of urban freight transport models and support of their application (p.51)		SST 2008 421 / SST 2008 63 / SST 2008 272 / SST 2008 274 / SST 2008 275 / SST 2008 276 / SST 2008 312 / SST 2008 316 / TPT 2008 1 / TPT 2008 2 / TPT 2008 3 / TPT 2008 5 / TPT 2008 6 / TPT 2008 8 / TPT 2008 13		SST 2010 13-1 / SST 2010 13-2 / TPT 2010 4 TPT 2010 5		TPT 2012 1-4/ TPT 2012 2-1 / TPT 2012 2-2
Remar-que	A rajouter	Dissemination, communication, "raising awaireness, involvment, incentives for participation & coordination)	SST 2008 64 / TPT 2008 11 / TPT 2008 12		TPT 2010 10		
		Coopération entre différents acteurs internationaux, market uptake	TPT 2008 14				TPT 2012 3-1

ANNEX 6: CROSS CHECK WITH ERTRAC URBAN MOBILITY ROADMAPS

Major compo-nents	Topics	Research actions	ERRAC WP3 Top Priority	ERTRAC Urban Mobility Roadmaps				
				Integration				User behaviour
				Information	Payment	Mobility management	Interface Freight & urban delivery	
1. User Needs and Behaviour (p. 24)	1.1. Better understanding of the mobility behaviour of individuals and firms (p.24)	1.1.1. Better understanding of social determinants of mobility behaviour (p.24)						x
		1.1.2. Mobility behaviour (p.24/25)	x					x
		1.1.3. Better understanding of temporal and spatial planning processes of humans (p.25)						x
		1.1.4. Better understanding the behaviour of shippers and freight transport service providers in the context of their business activities (p.25)						x
		1.1.5. Better understanding freight transport on the level of the operating humans (p.25)						x
		1.1.6. The user's willingness to pay for urban freight and passenger transport services (p.25)						x

		Any suggestion?		na	na	na	na	na
	1.2. Improving the accessibility and sustainability of our cities (p.25)	1.2.1. Development of an accepted method and identification of standard indicators to determine realised access (p.25)						
		1.2.2. Observation and evaluation of realized levels of access and associated costs for this access (p.25)						
		Any suggestion?		na	na	na	na	na
	1.3. Knowing the user: market research (p.25)	1.3.1. Better knowledge of the Public Transport user (p.25)	x					x
		1.3.2. Perception of safety and security (p.26)						x
		1.3.3. More participatory approach to the user demands (p.26)						x
		Any suggestion?		na	na	na	na	na
	1.4. Impact of policy measures and system innovations on mobility behaviour (p.26)	1.4.1. Impact of new information and payment services on mobility behaviour (p.26)	x					x
		1.4.2. Obtaining estimates of adjustment costs related to behavioural changes (p.26)						x
		1.4.3. Assessment of current hard and soft measures for the improvement of demand management (p.26)						x

		Any suggestion?		na	na	na	na	na
	1.5. Impact of societal changes on mobility behaviour (p.26)	1.5.1. The impacts of future societal changes in cities on the demand for passenger transport (p.26/27)	x					
		1.5.2. The influence of population and behavioural changes on goods consumption and freight transport demand (p.27)						
		1.5.3. The gap between the security issue as seen by the institutional actors and the security issue as perceived by the public (p.27)						
		1.5.4. Behaviour and travel patterns according to age and to activity (p.27)	x					
		1.5.5. Links between (perceived) safety of the mobility system and mobility choices (p.27)						
		Any suggestion?		na	na	na	na	na
	1.6. How to actively influence user behaviour (p.27)	1.6.1. The relationship between the exact presentation of information and promotion on transport and mobility options, and the behaviour of users and non-users (p.27)						x
		1.6.2. The distinction in behavioural impacts between “pulling” (e.g. incentives,						x

		promotion) and “pushing” (restrictions, legal requirements, road-charging (p.27)						
		1.6.3. How can new city logistics concepts best be presented in order that individual carriers cooperate? (p.27)					x	
		Any suggestion?		na	na	na	na	na
	1.7. User acceptance analyses (p.27)	1.7.1.How to combine road pricing with other measures (parking policies, changes in infrastructure, stimulating flexible working hours, pricing of public transport, reserved lanes and prioritization measures for PT, gratification of “low emission behaviour”)? (p.27/28)			x	x		
		1.7.2. How to increase acceptance of pricing policies? (p.28)						x
		1.7.3. Multimodal passenger transport concepts (p.28)	x					x
		1.7.4. Technological solutions (p.28)						x
		1.7.5. Speed management (p.28)						x
		Any suggestion?		na	na	na	na	na

2. Urban Structure (p.29)	2.1. Analysis and assessment of interactions between urban land use and transport (p.30)	2.1.1. Better understanding of influences which determine people's and firms' choice of location (p.30)						(x)
		2.1.2. Evaluation of impacts of different travel modes on space consumption (p.30)						
		Any suggestion?		na	na	na	na	na
	2.2. Making land development more sustainable through more efficient taxation (p.30)	2.2.1. Development of methodologies on how to estimate land value (p.31)						
		2.2.2. Quantifying the individual contribution of publicly provided goods (in particular transport infrastructures and services) to the value of a property (p.31)						
		2.2.3. Identification of needed changes in the legal framework to implement land value capture (p.31)						
		2.2.4. Measures on how to overcome resistance in regards to implementation of land value capture (p.31)						
		Any suggestion?		na	na	na	na	na
	2.3. More efficient use of existing transport infrastructure	2.3.1. How to make better use of existing transport infrastructure (esp. road infrastructure) (p.31)						

		2.3.2. How to set incentives for a more space-efficient use of transport, how land use planning can contribute best (p.31)						
		Any suggestion?		na	na	na	na	na
	2.4. Developing approaches for integrated planning (p.31)	2.4.1. Advanced models integrating land-use, transport and environment (p.31)						
		2.4.2. Development of easy-to-use decision support tools which can help local authorities to assess the possible impact of broad integrated policy packages within sustainable urban transport planning (p.31)						
		2.4.3. Development of adequate policies to direct locations of new housing and urban activities in more consistency with sustainability goals (p.32)						
		2.4.4. Development of procedures for systematic transport impact assessment of new land uses in order to enable promotion of better integrated locations (p.32)						
		2.4.5. Systematic analyses of the advantages and disadvantages of different institutional settings and						

		ways of horizontal and vertical co-ordination in land use and transport planning (p.32)						
		Any suggestion?		na	na	na	na	na
	2.5. Fostering the use of integrated planning approaches (p.32)	2.5.1. Analysis of training needs and development of further training programmes for professionals across Europe for a better understanding of urban planning objectives and processes (p.32)						
		2.5.2. Further guidance on the integration of land use and transport planning concerning non-institutionalised ways of cooperation, participation and flexible planning processes to develop strategies for improving consensus building and acceptance of solutions while speeding up planning processes (PILOT) (p.32)						
		2.5.3. Incentives and support for consistent implementation of municipal environmental plans integrated with other plans impacting the urban development (LIVEABLE CITIES) (p.32)						

		Any suggestion?		na	na	na	na	na
3. Mobility Services (p.33)	3.1. Towards seamless multimodal transport (p.34)	3.1.1. Information and payment services for different modes (p.34)	x	x	x			
		3.1.2. Positioning systems for cyclists and pedestrians (p.34)						
		3.1.3. Compilation and dissemination of good practices for demand responsive transport schemes to supplement transport services either for targeted groups or in non dense areas (p.34)						
		3.1.4. Quiet night delivery, IT and communication systems for trip planning and customer information (p.35)						
		3.1.5. Systems that provide real-time information on the location of the vehicles in the freight transport chain (p.35)					x	
		3.1.6. Possibility to link services for passenger transport with logistics (p.35)					x	
		Any suggestion?		na	na	na	na	na
	3.2. Compatible urban mobility services (p.35)	3.2.1. Standards for interregional interoperability of urban mobility services / 'white spots' (p.35)						
		3.2.2. Clear, concise and readable signage in public		x				

		transport networks and their surroundings (p.35)						
		3.2.3. Integration of car and bike sharing in the urban transport system (p.35)						
		Any suggestion?		na	na	na	na	na
	3.3. Customisation of services (p.35)	3.3.1. How to translate the needs of different user groups into functional service requirements, so that those services can be tailored to the user's needs (p.36)						
		3.3.2. How to personalize services in a customer-friendly way, without too much hassle for the user when providing personal data (p.36)						
		3.3.3. How to integrate location-based services in the service supply (p.36)						
		3.3.4. How to sufficiently protect the privacy of users of personalised systems (p.36)						
		3.3.5. E-ticketing and fare management systems (p.36)			x			
		3.3.6. The impact and opportunity of developing further charging schemes (p.36)						
		Any suggestion?		na	na	na	na	na

	3.4. Development of sound business models and organisational frameworks (p.36)	3.4.1. Development of organisational schemes that enable entrepreneurship in service provision and encourage intermodal and interregional cooperation (p.36)						
		3.4.2. Conditions of coordination and cooperation of actors, including the travellers, in these matters (p.36)						
		3.4.3. Sustainable business cases both for future mobility services and network management systems (p.36)						
		3.4.4. Understanding the costs of different systems to determine the feasibility of future pricing systems (p.37)						
		3.4.5. Who bears the responsibilities of implementing pricing reforms and deciding on the utilization of possible revenues, and how coordination could best be ensured should these responsibilities not reside with the same institutions (IMPRINT NET) (p.37)						
		Any suggestion?		na	na	na	na	na
	3.5. Technical issues (p.37)	3.5.1. Development of tools that to use real-time traffic	x	x		x		

		and travel information data for dynamic/intelligent network management (p.37)						
		3.5.2. Development of new technical standards for ticketing, information integration, charging systems and satellite positioning applications as well as research on the interoperability of systems and policies (p.37)		x	x	x		
		3.5.3. Improving data collection on congestion and the environmental situation (p.37)				x		
		Any suggestion?		na	na	na	na	na
4. Integrated Systems (p.38)	4.1. Reducing negative impacts of urban transport (p.39)	4.1.1. Urban road safety: taking into account the mix of transport modes (p.39)						
		4.1.2. Improving the security of transport systems (p.40)						
		4.1.3. Clean and silent vehicles for an environment-friendly urban mobility (p.40)	x					
		Any suggestion?		na	na	na	na	na
	4.2. Towards integrated urban transport networks (p.41)	4.2.1. Sharing infrastructures (p.41)				x		
		4.2.2. Funding urban transport (p.42)						
		4.2.3. From interchanges to intermodality (p.42)	x			x		

		4.2.4. Towards intelligent integrated network management (p.42/43)	x			x		
		Any suggestion?		na	na	na	na	na
	4.3. Implementation of new urban freight concepts (p.43)	4.3.1. Methods for raising problem awareness and influencing the willingness of all actors to support the implementation of new city-logistic-concepts (p.43)					x	
		4.3.2. Development of new techniques for the transport on the last kilometres and introduction of more city friendly vehicles such as small electric or hybrid vehicles (p.43)						
		4.3.3. Effects of societal changes in cities on commercial and freight transport (p.43)						
		4.3.4. Development of intelligent agent-based technologies (p.43)					x	
		4.3.5. Definition of an optimum between the benefits of certain technical alternatives (like underground delivery) and their costs (p.43)						
		4.3.6. Environmental aspects (noise, pollution, energy use) related to urban freight transport (p.43)						

		4.3.7. Harmonisation of legislation on freight delivery (p.44)						
		Any suggestion?		na	na	na	na	na
	4.4. Strengthening of the alternatives for the private car (p.44)	4.4.1. Pedestrians and cyclists (p.44)						
		4.4.2. Public transport operation: better data for improved operation (p.44)	x					
		4.4.3. Taxis and alternative modes: towards less cars, more occupied (p.45)						
		4.4.4. Organisational and regulatory framework for urban transport (p.45/46)						
		4.4.5. Innovations in public transport infrastructure and rolling stock (p.46)	x					
		Any suggestion?		na	na	na	na	na
5. Urban Transport Demand Analysis And Modelling For Policy Support (p.47)	5.1. Improvement of data collection on the issue of passenger transport (p.47)		x			x		
	5.2. Improvement of data collection on the issue of urban freight transport through joint efforts (p.48)						x	
	5.3. Standardisation of survey design and indicators for urban passenger and freight transport (p.48)							
	5.4. Improving methods like data fusion and synthetic matching (p.48/49)			x		x		
	5.5. Improving complementary data collection and reliability of data (p.49)			x		x		

	5.6. Strengthening our understanding of user aspects by modelling user behaviour (p.49)						x
	5.7. Improvement of transport models integrating all fields of urban planning and management (p.50)				x		
	5.8. Reduction of barriers for practical use of up-to-date models (p.50/51)				x	x	
	5.9. Improvement of urban freight transport models and support of their application (p.51)					x	
	Any suggestion?		na	na	na	na	na

ANNEX 7: WHITE PAPER INITIATIVES RELEVANT FOR URBAN MOBILITY

White Paper on Competitive and Sustainable Transport

List of Urban Mobility relevant initiatives and (actions)

(abstracts)

1. AN EFFICIENT AND INTEGRATED MOBILITY SYSTEM

1.1. A Single European Transport Area

(7) Multimodal transport of goods: e-Freight

Create the appropriate framework to allow tracing goods in real time, ensure intermodal liability and promote clean freight transport:

- Put in practice the concepts of 'single window' and 'one-stop administrative shop'; by creating and deploying a single transport document in electronic form (electronic waybill), and creating the appropriate framework for the deployment of tracking and tracing technologies, RFID etc.).
- Ensure that liability regimes promote rail, waterborne and intermodal transport.

1.2. Promoting quality jobs and working conditions

(11) An evaluation of the EU approach to jobs and working conditions across transport modes

- Conduct an appraisal of the sectoral social dialogue processes taking place in the various segments of the transport sector to the end of improving social dialogue and facilitating its effectiveness.
- Ensure employee involvement, in particular through European Works Councils, in transnational companies in the sector.
- Address quality of work in all transport modes, with respect to, notably, training, certification, working conditions and career development, with a view to creating quality jobs, developing the necessary skills and strengthening the competitiveness of EU transport operators.

1.3. Secure Transport

(14) Land transport security

- Work with Member States on the security of land transport, establishing as a first step a permanent expert group on land transport security and introducing further measures where EU action has added value. Special focus will be put on urban security issues.

(15) 'End-to-end' security

- Increase the level of security along the supply chain without impeding the free flow of trade. 'End-to-end' security certificates should be considered taking into account existing schemes.
- Joint Security Assessment covering all modes of transport.
- Integrate potential effects of terrorist and criminal attacks in the preparation of mobility continuity plans (cf. Initiative 23)
- Pursue international cooperation in the fight against terrorism and other criminal activities like piracy. The external dimension (cf. Initiative 40) is crucial.

1.5. Service quality and reliability

(21) Passengers' rights

- Develop a uniform interpretation of EU Law on passenger rights and a harmonised and effective enforcement, to ensure both a level playing field for the industry and a European standard of protection for the citizens.
- Assemble common principles applicable to passengers' rights in all transport modes (Charter of basic rights), notably the 'right to be informed', and further clarify existing rights. At a later stage, consider the adoption of a single EU framework Regulation covering passenger rights for all modes of transports (EU Codex).
- Improve the quality of transport for elderly people, Passengers with Reduced Mobility and for disabled passengers, including better accessibility of infrastructure.
- Complete the established legislative framework on passenger rights with measures covering passengers on multimodal journeys with integrated tickets under a single purchase contract as well as in the event of transport operator's bankruptcy.
- Improve the level playing field at international level through the inclusion of care quality standards in bilateral and multilateral agreements for all modes of transport, with a view to further passengers' rights also in the international context.

(22) Seamless door-to-door mobility

- Define the measures necessary for further integrating different passenger transport modes to provide seamless multimodal door-to-door travel.
- Create the framework conditions to promote the development and use of

intelligent systems for interoperable and multimodal scheduling, information, online reservation systems and smart ticketing. This could include a legislative proposal to ensure access of private service providers to travel and real time traffic information.

(23) Mobility Continuity Plans

Ensure the definition of mobility plans to ensure service continuity in case of disruptive events. The plans should address the issue of prioritisation in the use of working facilities, the cooperation of infrastructure managers, operators, national authorities and neighbouring countries, and the temporary adoption or relaxation of specific rules.

2. INNOVATING FOR THE FUTURE: TECHNOLOGY AND BEHAVIOUR

2.1. A European Transport Research and Innovation Policy

(24) A technology roadmap

Fragmentation of research and development efforts in Europe is most harmful, and joint European efforts will bring the greatest European added value in areas such as:

- Clean, safe and silent vehicles for all different modes of transport, from road vehicles to ships, barges, rolling stock in rail and aircraft (including new materials, new propulsion systems and the IT and management tools to manage and integrate complex transport systems).
- Technologies to improve transport security and safety.
- Potential new or unconventional transport systems and vehicles such as unconventional systems for goods distribution.
- A sustainable alternative fuels strategy including also the appropriate infrastructure.
- Integrated transport management and information systems, facilitating smart mobility services, traffic management for improved use of infrastructure and vehicles, and real time information systems to track and trace freight and to manage freight flows; passenger/travel information, booking and payment systems.
- Intelligent infrastructure (both land and space-based) to ensure maximum monitoring and inter-operability of the different forms of transport and communication between infrastructure and vehicles.
- Innovations for sustainable urban mobility following up the CIVITAS programme and initiatives on urban road pricing and access restriction schemes.

(25) An innovation and deployment strategy

Identify the necessary innovation strategies including the appropriate governance and the financing instruments in order to ensure a rapid deployment of results developed in the research process. Examples are:

- Deployment of smart mobility systems such as ITS, and the next generation of multimodal traffic management and information systems.
- Definition and deployment of an open standard electronic platform for vehicle on board units, performing various functions including road charging.
- Development of a plan for investment in new navigation, traffic monitoring and communication services to allow for the integration of information flows, management systems and mobility services based on a European Integrated Multimodal Information and management Plan. Demonstration projects for electro mobility (and other alternative fuels) including recharging and refueling infrastructure and intelligent transport systems focusing in particular on those urban areas where air quality levels are frequently exceeded.
- Smart mobility partnerships and demonstration projects for sustainable urban transport solutions (including demonstrators for road pricing schemes etc).

(26) A regulatory framework for innovative transport

Identify the necessary regulatory framework conditions through standardisation or regulation:

- Appropriate standards for CO_2 emissions of vehicles in all modes, where necessary supplemented by requirements on energy efficiency to address all types of propulsion systems;
- Vehicle standards for noise emission levels;
- Ensure that CO_2 and pollutant emissions are reduced under real-world driving conditions by proposing at the latest by 2013 a revised test cycle to measure emissions;
- Public procurement strategies to ensure rapid up take of new technologies;
- Rules on the interoperability of charging infrastructure for clean vehicles;
- Guidelines and standards for refuelling infrastructures;
- Interface standards for infrastructure-to-infrastructure, vehicle-to-infrastructure, and vehicle-to-vehicle communications;
- Access conditions to transport data for safety and security purposes;
- Specifications and conditions for transport related smart charging and payment systems;
- Better implementation of existing rules and standards.

2.2. Promoting more sustainable behaviour

(27) Travel information

- Promote awareness of the availability of alternatives to individual conventional transport (drive less, walk and cycle, car sharing, park & drive, intelligent ticketing etc.)

(28) Vehicle labelling for CO_2 emissions and fuel efficiency

- Review the labelling Directive to make it more effective. This will, inter alia, consider the extension of the scope to light commercial and L-category vehicles, and the harmonisation of the label and vehicles fuel efficiency classes throughout the Member States.

(29) Carbon footprint calculators

- Encourage business-based GHG certification schemes and develop common EU standards in order to estimate the carbon footprint of each passenger and freight journey with versions adapted to different users such as companies and individuals. This will allow better choices and easier marketing of cleaner transport solutions.

(30) Eco-driving and Speed limits

- Include eco-driving requirements in the future revisions of the driving licence directive and take steps to accelerate the deployment of ITS applications in support of eco-driving.
- Fuel saving techniques should also be developed and promoted in other modes – for example continuous descent for aircrafts.

2.3. Integrated urban mobility

(31) Urban Mobility Plans

- Establish procedures and financial support mechanisms at European level for preparing Urban Mobility Audits, as well as Urban Mobility Plans, and set up a European Urban Mobility Scoreboard based on common targets. Examine the possibility of a mandatory approach for cities of a certain size, according to national standards based on EU guidelines.
- Link regional development and cohesion funds to cities and regions that have submitted a current, and independently validated Urban Mobility Performance and Sustainability Audit certificate.
- Examine the possibility of a European support framework for a progressive implementation of Urban Mobility Plans in European cities.
- Integrated urban mobility in a possible Smart Cities Innovation Partnership.
- Encourage large employers to develop Corporate/Mobility Management Plans.

(32) An EU framework for urban road user charging

- Develop a validated framework for urban road user charging and access restriction schemes and their applications, including a legal and validated operational and technical framework covering vehicle and infrastructure applications.

(33) A strategy for near- 'zero-emission urban logistics' 2030

- Produce best practice guidelines to better monitor and manage urban freight

flows (e.g. consolidation centres, size of vehicles in old centres, regulatory limitations, delivery windows, unused potential of transport by river).

- Define a strategy for moving towards 'zero-emission urban logistics', bringing together aspects of land planning, rail and river access, business practices and information, charging and vehicle technology standards.
- Promote joint public procurement for low emission vehicles in commercial fleets (delivery vans, taxis, buses…).

3. MODERN INFRASTRUCTURE AND SMART FUNDING

3.1. Transport infrastructure: territorial cohesion and economic growth

(34) A core network of strategic European infrastructure – A European Mobility Network

- Deploy large scale intelligent and interoperable technologies (ITS, etc.) to optimise the capacity and the use of infrastructure.
- Ensure that EU-funded transport infrastructure takes into account energy efficiency needs and climate change challenges (climate resilience of the overall infrastructure, refuelling/recharging stations for clean vehicles, choice of construction materials…).

(36) Ex-ante project evaluation criteria

- Introduce ex-ante project evaluation criteria ensuring that infrastructure projects duly demonstrate the EU added value or are based on 'services rendered' and generate sufficient revenue.
- Streamline procedures for projects of overriding European interest, in order to ensure:
  (i) reasonable time limits for completing the whole cycle of procedures;
  (ii) a communication framework that is in line with the project implementation;
  (iii) integrated planning which takes environmental issues into account in early stages of the planning procedure.
- Introduce PPP-screening to the ex-ante evaluation process to ensure that the option of PPP has been carefully analysed before a request for EU funding is being asked.

3.2. A coherent funding framework

(37) A new funding framework for transport infrastructure

- Provide EU support for developing and deploying technologies that improve infrastructure use efficiency and decarbonisation (new road network pricing and tolling systems, ITS and capacity improvement programs).

(38) Private sector engagement

- In the context of the cooperation framework established between the

Commission services and EPEC, encourage MS to use more PPPs, while acknowledging that not all projects are suitable for this mechanism, and provide relevant expertise to Member States.

- Participate in designing new financing instruments for the transport sector, particularly the EU project bond initiative.

3.3. Getting prices right and avoiding distortions

(39) Smart pricing and taxation
Phase I (up to 2016)

- Transport charges and taxes should be restructured. They should underpin transport's role in promoting European competitiveness, while the overall burden for the sector should reflect the total costs of transport in terms of infrastructure and external costs.
- Revise motor fuel taxation with clear identification of the energy and CO_2 component.
- Phase in a mandatory infrastructure charge for heavy-duty vehicles. The scheme would introduce a common tariff structure and cost components such as the recovery of wear and tear, noise and local pollution costs to replace the existing user charges.
- Evaluate existing car road charging schemes and their compatibility with the EU Treaties.
- Develop guidelines for the application of internalisation charges to road vehicles, covering the social costs of congestion, CO_2 – if not included in fuel tax – local pollution, noise and accidents. Provide incentives to Member States who launch pilot projects for the implementation of schemes along such guidelines.
- Proceed with the internalisation of external costs for all modes of transport applying common principles while taking into account the specificity of each mode.
- Create a framework for earmarking revenues from transport for the development of an integrated and efficient transport system.
- Issue guidelines providing clarification concerning public funding to the different modes of transport and to transport infrastructure, where necessary.
- Reassess transport taxation where necessary, namely by linking vehicle taxation to environmental performance, reflecting on possible way forward to review the current VAT system concerning passenger transport, and revising company car taxation to eliminate distortions and favour the deployment of clean vehicles.

Phase II (2016 to 2020)

- Building on Phase I, proceed to the full and mandatory internalisation of external costs (including noise, local pollution and congestion on top of the mandatory recovery of wear and tear costs) for road and rail transport.

Internalise costs for local pollution and noise in ports and airports, as well as for air pollution at sea, and examine mandatory application of internalisation charges on all inland waterways on EU territory. Develop market based measures to further reduce GHG emissions.

4. THE EXTERNAL DIMENSION

(40) Transport in the World: The external dimension

Transport is fundamentally international. Because of this, most actions in this White Paper are linked to challenges related to the development of transport beyond the EU borders. Opening up third country markets in transport services, products and investments continues to have high priority. Transport is therefore included in all our trade negotiations (WTO, regional and bilateral). Flexible strategies will be adopted to ensure the EU's role as a standard setter in the transport field. To that end, the Commission will focus on the following areas of actions:

- Extend internal market rules through work in international organisations (WTO, ICAO, IMO, OTIF, OSJD, UNECE, the international river commissions etc) and, where relevant, attain full EU membership. Promote European safety, security, privacy and environmental standards worldwide. Reinforce the transport dialogue with main partners.
- Take action in multilateral forums and bilateral relations to promote policy targeted at the energy efficiency and climate change goals of this White Paper.
- Continuously use multilateral (in ICAO, IMO and WCO) and bilateral layers to tackle the issue of terrorism, envisaging international agreements and enhanced security dialogues with strategic partners, starting with the US. Cooperate on joint threat assessments, training of third countries officers, joint inspections, piracy prevention, etc. Ensure recognition of the EU concept of 'one stop security' system internationally.
- Develop a cooperation framework to extend our transport and infrastructure policy to our immediate neighbours, to deliver improved infrastructure connections and closer market integration, including in the preparation of mobility continuity plans.
- Build on established research and innovation partnerships to find common answers to the challenges related to interoperability of transport management systems, sustainable low carbon fuels, security and safety.