

Draft paper  
**State-of-the-Art Urban Mobility**

TU Dresden  
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## **2. Introduction**

### **2.1. Background**

(in process)

### **2.2. Objectives of EURFORUM**

“The European Research Forum for Urban Mobility (EURFORUM) is a Coordination Action, which will focus on a better and more innovative coordination of research serving urban mobility of persons and goods”<sup>1</sup>.

On European level many initiatives on urban mobility have been developed already in FP 5 and FP 6 which include recommendations for future research activities, e.g. VOYAGER, CIVITAS, etc. The European Commission actively has supported the creation of “technology platforms” for various transport sectors like ERRAC for rail, ERTRAC for road etc. They all are “modal platforms” which represent only to a limited extent a multimodal integral approach of metropolitan and regional transport problems.<sup>2</sup>

The EURFORUM-Project will aim at filling the gap between existing technology platforms and help raise the priority of urban mobility research within European, national and local research programmes. EURFORUM will offer a chance for a co-ordinated and integrated approach on mobility research focussed on urban areas, where most of the European population lives and most economic activities are concentrated. All urban transport modes will be considered and special attention will be given to intermodal transport research issues<sup>3</sup> and will focus both on technology-oriented and on policy-oriented research. The project shall pay special attention to urban mobility challenges in the New Member States”<sup>4</sup>.

“The overall objective of EURFORUM is to better structure and better coordinate European research on urban mobility for passengers and goods, by involving all relevant stakeholders on urban mobility research in the discussion”<sup>5</sup>.

### **2.3. Approach taken in this review**

This State-of-the-art paper reports achievements of European urban mobility research so far. The comparison of current state-of-the-art and future needs will serve as a basis for the development of forward-looking and adjusted research objectives being structured in the Strategic Urban Mobility Research Agenda (SUMRA)<sup>6</sup>.

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<sup>1</sup> Annex I - “Description of Work”, Page 3

<sup>2</sup> Annex I - “Description of Work”, Page 5

<sup>3</sup> Annex I - “Description of Work”, Page 6

<sup>4</sup> Annex I - “Description of Work”, Page 3

<sup>5</sup> Annex I - “Description of Work”, Page 3

<sup>6</sup> Annex I - “Description of Work”, Page 41

For this

1. a list was rendered with all relevant programmes and projects for EURFORUM.
2. a questionnaire/template was designed to analyse the documents.
3. Every project partner reviewed some documents und filled in the template.
4. Afterwards there was made a classification of the documents with specific issues and a quantitative evaluation.
5. Starting from the templates a topic specific aggregation of programmes and projects was made.

### **3. What is Urban Mobility and what are its challenges?**

#### **3.1. definition(s)**

“Urban”:  
Relating to cities/conurbations, which “are places where people gather for the purpose of economic and social interaction.”<sup>7</sup>

“Mobility”:  
Mobility enables participation (access) in activities for different purposes at different locations and refers to physical travel. Activities for passenger transport can be residing, working, shopping, educating, recreating etc. Activities for freight transport can be extracting raw material, processing, storing, selling, recycling etc.

“Urban Mobility”:  
Therefore “Urban Mobility” in EURFORUM can be understood as urban transport of passengers and freight in relation to conurbations. It includes users and their interaction, the transport system, vehicles and infrastructure and their interaction, impacts of transport and relevant tools in an urban context. Under the term ‘urban mobility’ we also understand in this case transport between an agglomeration and its hinterland”<sup>8</sup>.

#### **3.2. What do we need urban mobility for and how should it look like**

(in process)

A sustainable mobility is a major component of the transport policy defined in the 2001 White Paper: time to decide. The research on urban mobility is very widespread and diverse. Urban public transport is a key issue in Europe.

#### **3.3. Today’s problem and future challenges**

(in process)

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<sup>7</sup> EXTR@Web, D2.A November 2005

<sup>8</sup> Annex I - “Description of Work”, Page 3

- Some of the main trends currently affecting regional and urban public transport are the scarcity of public money and the increasing deregulation and privatisation<sup>9</sup>
- it is essential for the PT sector to ensure economic efficiency and effectiveness of the PT system<sup>10</sup>
- to achieve a better capacity utilisation of PT network<sup>11</sup>

## 4. Sources of Information

Overview over all reviewed papers/sources in a table classified by:

- Projects and Project reviews
- Policy documents
- Others

### 4.1. Projects and Project Reviews

Short title	Long title
PLUME SoA (LUTR CLUSTER)	Planning and Urban Mobility in Europe: State-of-the-Art Review (Land Use and Transportation Research Cluster)
EXTRAWEb - URBAN - ANNUAL REPORT	EXTR@Web Project: Second Annual Thematic Research Summary –Urban Transport
ADONIS	Analysis and Development of New Insight into Substitution of Short Car Trips by Cycling and Walking
BESTRANS - Benchmarking of Energy and Emission Performance in Urban Public Transport Operations	Benchmarking Public Transport Emissions and Energy Use
CONNECT - Expert Network on Flexible Transport Services	Co-ordination of Concepts for new collective Transport - Expert Network on Flexible Transport Services
COUNTERACT - Cluster of User Networks in Transport and Energy Relating to Anti-Terrorist Activities	
DUMAS	Developing Urban Management and Safety
ELTIS	European Local Transport Information Service
EURNEX	European Rail Research Network of Excellence
FAMS - Upgrade of Current Demand Responsive Transport Services	
GUIDEMAPS - Promotion of Stakeholder Participation in Urban Transport Decision Making	Gaining Understanding of Improved Decision Making and Participation Strategies

<sup>9</sup> VOYAGER SoA Page 13

<sup>10</sup> VOYAGER SoA Page 13

<sup>11</sup> VOYAGER SoA Page 13

ISOTOPE	Improved Structure and Organisation for Transport Operations of Passengers in Europe
LIBERTIN	Light Rail Thematic Network
MARETOPE	Managing and Assessing Regulatory Evolution in Local Public Transport Operations in Europe
MODUrban	Modular Urban Guided Rail Systems
MOSES	Mobility Services for Urban Sustainability
NICHES	New and Innovative Concepts for Helping European Transport Sustainability
NPF-Urban Transport Project	National Policy Frameworks for Urban Transport
PORTAL	Promotion of Results in Transport Research and Learning
PROMPT	New Means to Promote Pedestrian Traffic in Cities
QCITY	Quiet City Transport
SAFETRAM	Passive Safety of Tramways for Europe
SILENCE	Quieter Surface Transport in Urban Areas
TRANSECON	Assessment of Urban Transport and Local Socio-Economic Development
TRANSLAND	Integration of Transport and Land-Use Planning
UrBike	Urban Bicycling - Maximisation of Bicycling in Cities
INNER URBAN FREIGHT	Inner Urban Freight Transport and City Logistics (taken from portal project)
CIVITAS – VIVALDI (Reports)	CIVITAS-VIVALDI – Visionary And Vibrant Actions through Local transport Demonstration
Public Transport Organisation and Policy	Public transport organisation and policy, Working group report
VOYAGER SoA	Vehicle for Mobility - Advancing Public Passenger Transport in Europe State-of-the-Art Analysis
VELOINFO - European Network for Cycling Expertise	
TRANSITS SoA	Intelligent Public Transport System – State-of-the-art in Europe
ERA-NET TRANSPORT (zwei verschiedene vorhanden)	ERA-NET TRANSPORT – Trans-national Transport Research Road Map

## 4.2. Policy Documents

Short title	Long title
ERRAC SRRA	European Rail Research Advisory Council Strategic Rail Research Agenda
ERRAC SRRA	European Rail Research Advisory Council Technical Annex
ERRAC Rail21	European Rail Research Advisory Council Rail 21: Sustainable Rail Systems for a Connected Europe

ERTRAC Vision + Challenges	European Road Transport Research Advisory Council Vision 2020 and Challenges
ERTRAC SRA	European Road Transport Research Advisory Council Strategic Research Agenda
ENTRAC Research Framework	European Road Transport Research Advisory Council Research Framework
VOYAGER – Future Trends and Challenges	Vehicle for Mobility - Advancing Public Passenger Transport in Europe Future Trends, Impacts and Key Challenges
VOYAGER – Policy Recommendations	Vehicle for Mobility - Advancing Public Passenger Transport in Europe Policy and Research Recommendations
UITP PT 2020	International Association of Public Transport: Public Transport 2020
UITP SRA	International Association of Public Transport: Strategic Research Agenda
URBAMOVE	Urban Mobility Initiative
EC WHITE PAPER MID-TERM REVIEW 2006	European Commission: Mid-term review of the European Commission's 2001 Transport White Paper
EC STRATEGY ON URBAN ENVIRONMENT (REPORT OF S.U.T. GROUP)	
EC STRATEGY ON URBAN ENVIRONMENT (COMMUNICATION)	Communication from the Commission to the Council and the European Parliament on Thematic Strategy on the Urban Environment
EC GREEN PAPER SECURITY OF ENERGY SUPPLY	European Commission: Greenpaper "A European Strategy for sustainable, Competitive and Secure Energy"
EC GREEN PAPER ON ENERGY EFFICIENCY	European Commission: Green Paper on Energy Efficiency "Doing more with less"
Strategic Research Agenda for European Construction Sector	Strategic Research Agenda for European Construction Sector
ECMT: IMPLEMENTING STRATEGIES FOR SUST. URB. TRAVEL	European Conference of Ministers of Transport: Urban Travel and Sustainable Development
Stakeholders' Contribution to the Formation of the FP7 Work Programme on ICT for Mobility	Stakeholders' Contribution to the Formation of the FP7 Work Programme on ICT for Mobility
Opinion of the Comitee of the Regions	Opinion of the Comitee of the Regions: the urban contribution to growth and jobs in the regions
DESTOT REPORT FOR DG TREN	DG TREN Forum – Urban transport – reported by Michel Destot
ATLANTIC	A thematic long-term approach to networking for the Telematics and ITS community
TRANSITS - WORK PLAN FOR FUTURE RESEARCH	Workplan for Future Research in Intelligent Public Transport Sytems
ERA-NET TRANSPORT	ERA-NET TRANSPORT – Themes for future trans-nationale cooperation in transport research programming

#### 4.3. Missing allocation

- eMobility, ISI, ARTEMIS, NEM, NESSI, EUROP, MANUFUTURE, ECTP
- REMAINING PROJECTS FROM THE PROPOSAL
- PARAMOUNT

#### 4.4. Overview of reviewed documents

Red colour = not reviewed

##### DOCUMENT

No	Title	Received
1	ERRAC SRRA (STRATEGIC RAIL RESEARCH AGENDA)	X
2	ERRAC SRRA (TECHNICAL ANNEX)	X
3	ERRAC RAIL21	X
4	ERTRAC VISION+CHALLENGES	
5	ERTRAC SRA	X
6	ERTRAC RESEARCH FRAMEWORK	X
7	VOYAGER SoA	X
8	VOYAGER - FUTURE TRENDS AND CHALLENGES	
9	VOYAGER - POLICY RECOMMENDATIONS	
10	TRANSITS SoA	X
11	TRANSITS WORK PLAN FOR FUTURE RESEARCH	X
12	PLUME SoA (LUTR CLUSTER)	
13	EXTRAWEBS - URBAN - ANNUAL REPORT	X
14	ERANET - TRANSPORT RESEARCH IN ERA (BY EXTRAWEBS)	
15	ERANET - TRANSPORT RESEARCH ROADMAP	X
16	URBAN FREIGHT SoA (TAKEN FROM PORTAL PROJECT)	X
17	CIVITAS REPORT(S)	X
18	UITP PT 2020	X
19	UITP SRA	X
20	URBAMOVE	X
21	EC WHITE PAPER MID-TERM REVIEW 2006	X
22	EC STRATEGY ON URBAN ENVIRONMENT (REPORT OF S.U.T. GROUP)	
23	EC STRATEGY ON URBAN ENVIRONMENT (COMMUNICATION)	
24	EC GREEN PAPER SECURITY OF ENERGY SUPPLY	X
25	EC GREEN PAPER ON ENERGY EFFICIENCY	X
26	ECMT: IMPLEMENTING STRATEGIES FOR SUST. URB. TRAVEL	
27	and cities: the urban contribution to growth and jobs in the regions	X
28	DESTOT REPORT FOR DG TREN	X
29	REMAINING PROJECTS FROM THE PROPOSAL	
	Projects	Received?
30	Car Trips by Cycling and Walking	X
31	and ITS community	X
32	BEST / UTB - Urban Transport Benchmarking Initiative	X
33	Public Transport Operations	X
34	CONNECT - Expert Network on Flexible Transport Services	X
35	Anti-Terrorist Activities	X
36	DUMAS - Developing Urban Management and Safety	



37	ELTIS - European Local Transport Information Service	X
38	EURNEX - European Rail Research Network of Excellence	X
39	FAMS - Upgrade of Current Demand Responsive Transport Services	X
40	Decision Making	X
41	Passengers in Europe	X
42	LIBERTIN - Light Rail Thematic Network	
43	Transport Operations in Europe	
44	MODURBAN - Modular Urban Guided Transport Systems	X
45	MOSES - Mobility Services for Urban Sustainability	X
46	Sustainability	X
47	NPF-Urban Transp. - National Policy Frameworks for Urban Transport	X
48	PORTAL - Promotion of Results in Transport Research and Learning	X
49	PROMPT - New Means to Promote Pedestrian Traffic in Cities	X
50	QCITY - Quiet City Transport	X
51	SAFETRAM - Passive Safety of Tramways for Europe	
52	SILENCE - Quieter Surface Transport in Urban Areas	X
53	Development	X
54	TRANSLAND - Integration of Transport and Land-Use Planning	X
55	UrBike - Urban Bicycling - Maximisation of Bicycling in Cities	
56	VELOINFO - European Network for Cycling Expertise	
	EXTRA	
57	eMobility, ISI, ARTEMIS, NEM, NESSI, EUROP, MANUFUTURE, ECTP	X
58	Strategic Research Agenda for the European Construction Sector	X
59	E-Safety	X

## 5. State of the art in Urban Mobility Research, Planning, Managing and Policy

### 5.1. List of subtopics:

A1	Urban Transport Demand Analysis/Data collection
A2	Preparation and provision of transport data
B1	Sustainable strategies – Land use and transport planning
B2	Sustainable strategies – Traffic Management and Road Safety
B3	Sustainable strategies - Institutional Aspects
B4	Sustainable strategies - Environmental Aspects
B5	Sustainable strategies - Freight transport
B6	Sustainable strategies - Economical Aspects
C1	Urban transport supply side - integrated and harmonised services
C2	Urban transport supply side - integrated and harmonised systems
D1	Safety and Security
D2	Comfort, Quality
D3	Accessibility, Rights, Equality

D4 User Behaviour

## 5.2. Elaboration

### A1 Urban Transport Demand Analysis/Data collection

- specific information and accessibility needs of elderly and disabled person are well studied, although not often taken into account (10)
- Open research aspect: better socio-economic, demographic and urban transport data collection, analysis, modelling – using ITS and GIS (19)
- knowledge and data on behavioural reasons, barriers and advantages for using bicycles and walking in cities (30)
- Open research aspect: systematical evaluation of suggested measures (effects on modal split for environmental friendly modes) (30)
- lots of statistical data on urban transport indicators are available but at different levels (either national or regional, or at city or conurbation level) and not with standardized indicators and scope(47)
- not statistically representative data on public perception of urban transport performance and policy (47)
- Knowledge on users' needs for training and learning of transport research results (48)
- Definition of what kind of data is needed and should be gathered to prepare sustainable urban transport plans (PILOT)
- Demonstrations and advice on integrated land use/transport models, but barriers for practical implementation are availability of skilled staff in cities, cities' own unfamiliarity with those models and the availability of good databases for model construction, calibration, and validation (12)
- Open research: data problems: lack of consistent data on urban transport operations at a European level (41, S. 3); improve data basis for benchmarking of urban transportation in Europe (47, S. 3)

### A2 Preparation and provision of transport data

#### *Intelligent Public Transport Systems (10)*

- although many European public transport networks already developed and implemented information tools, especially on long-distance trips the user will have to contact each individual operator
- existing traveller information systems do not enough focus on inter-modality, regardless intra-/ inter-urban transport
- most of the projects worked on the problem of data modelling, system architecture, data exchange and interconnection of information systems in a multimodal environment
- various experiences with nationwide route and travel planners, fare integration, real-time travel information, door-to-door information systems etc.
- existing system architecture for nationwide and Europe-wide continuous and seamless timetable and transport information for multimodal travel including common data model, data registry and location- referencing scheme

- partial experiences and appropriate telematics platforms and operators (most suitable method and technical problems still to be found/solved)
- problem: standardisation – national/international travel information systems would be much easier to build if all local travel information applications could provide the same standardised output
- Internet technology is very appropriate means for providing personal pre-trip information; call-centres using Internet and computer aided telephone technology are very efficient
- broadcasting technology for collective pre-trip information
- evidence of positive cost-benefit ratio (cp. GOTIC project)

#### *Urban Freight (16)*

- Freight villages can improve their market shares for inter-modal transport among transport SME's by offering freight exchange systems (electronically) with specific informations (to be standardized) (16)
- Data needs are quite different between the diverse actors within the transport chain.
- The actors are very sensitive towards a decrease of statistical data./knowledge of only a part of the total transport chain.
- lack of reliable, frequently updated flow data by origin – destination appears as the most crucial need for the transport companies.
- Need for real time data to optimise their transport
- Data need very high, but willingness to pay low
- Today the main actors within the transport chain collect only data, which is useful for their immediate operational purpose. Data collection= “puzzle” coming from different sources.
- Main factors for the limited availability of data are: heterogeneity of information systems, Inconsistent definitions and units, companies considering their data as confidential.
- Proposed solutions concerning: official authorities, official framework for confidentiality, mediator collecting aggregated data, independent organisation for harmonising the collected data “ex ante”
- Inter-modal freight platforms necessary, providing infos (bis hierher alles 16)
- 

#### *Data provision and comparability of data on Urban Transport, its performance and public perception in Europe (15 member states)*

- Open research: final outputs for the urban rail systems to be used to produce standards at European and worldwide level (44, S. 3)
- Limited comparability due to different and not consistent definitions e.g. accident data (missing European standard for “slight” or “serious” injuries etc.) (47)
- Limited comparability of data on the performance of different PT operators
- Accessibility of data in Europe very varying depending on the indicator - input data mostly accessible (population, city size, car ownership, fuel costs, car prices etc.),

intermediate input data and output data/mobility indicators partially limited/not/easily available (47)

#### *Intelligent Public Transport Systems (10)*

- positive cost-benefit ratio (cp. GOTIC project)

#### *Urban Freight (16)*

- modal freight platforms necessary, providing infos (bis hierher alles 16)
- Data provision and comparability of data on Urban Transport, its performance and public perception in Europe (15 member states)

### **B1 Sustainable strategies – Land use and transport planning**

- Agreement on integrated strategies being more effective than strategies which focus on a limited set of measures, successful integrated strategies combine policy instruments to achieve synergy and to reduce barriers to their implementation (12)
- 3 principal elements of successful integrated strategies are enhancement of PT/walking/cycling; pricing of car use and land use policies designed to reinforce these two measures (12)
- Good practice in implementation of integrated urban transport strategies is less well understood, and has attracted less research, than other elements of the strategy development process, need for definition of staged implementation processes (12)
- concepts for the sustainable model settlements for different sites have been defined (13)
- strategies for planning the structure of model settlements gave priority to the requirements of sustainable transport modes (13)
- strategies gave priorities to pedestrian and PT by short distances and attractive pathways, linear polycentric development and decentralised concentration (13)
- a framework of incentives and legal/administrative instruments has been recommended to encourage sustainable urban development and design (13)
- knowledge on impacts of land use and impacts of transport policies on behaviour of travellers and shippers, use and pros/cons of land-use transport models for modelling transport and land-use policies at the urban and regional level (54)
- co-ordination of institutional actors (formal co-ordination), institutional framework of spatial planning and of transport planning, integration of land use and transport plans (material co-ordination), integrated implementation of policies through non institutionalised ways of co-operation, barriers to the implementation of integrated land use and transport policies, national planning systems (coordination of plans) and barriers to land use and transport policies contexts (54)
- empirical prove of effects concerning mixed land use: balanced residents-to-worker-ratios and residential density being inversely related to trip length, but not having any influence on trip frequency (12)
- modelling of land use and its effects show the major impact of land use planning policies on spatial development, but also a minor impact on travel patterns, but

the impacts of transport policies on travel patterns are still much stronger than those of land use on transport (12)

- knowledge from empiric studies and modelling on the major impact of higher accessibility of locations in generally generates longer trips and a more dispersed settlement structure (12)
- contents and methods of integrated sustainable urban transport plans are well known, still for many cities it is difficult to put those SUTPs in practice due to various barriers, more research is needed on the benefits of such plans and additional guidance to convince everyone of SUTP necessity (PILOT)
- complexity of decision-support tools (guidelines, best practice identification, assessment methods, planning methodologies or software tools) in land use and transport policies leads very often to decisions made without having a clear perception of what effects will be caused (12)
- Need of harmonisation of decision support tools to be used for land use and transport planning (12) – comment: reason for this statement is missing
- Harmonisation of decision support tools can increase co-operation between conflicting municipal units and objectives (12)
- Give priority to pedestrians in transport planning; green network in every city for walking (49, S. 4)
- Transport infrastructure can have a catalytic effect on re-urbanisation development and influence on land use [transport investment] (53, S. 5)
- Large scale infrastructure investment leads to a stimulation of socio-economic development in areas of improves accessibility, of re-urbanisation dependent on the potential development, which has a spatial diffusion and centralisation of shopping (53, S. 6)

## **B2 Sustainable strategies – Traffic Management and Road Safety**

- Research into high-quality PT for cities and urban regions that have populations between 100.000 and 500.000 people has produced a best practice guide on planning and designing a PT network (13)
- Harmonisation of concepts for the different grades of automation of urban rail guided transit systems; integrate the pedestrian scale in the city (44, S. 3)
- Innovative demand management strategies
- Transportation management association (TMAs)
- Local taxes or charges, ring-fenced for transport
- City-wide campaigns using marketing and branding (46, S. 3)
- Little effect on car ownership but effects on car speed in cities with metro projects, modal shift reduces car traffic in short terms, in longer term induced traffic can limit the reduction, an increase effect in number of PT trips, only small effect on time saving for car trip duration (53)
- Research needs for: parking management (role of dynamic signing of car parks, role of tariffs); compare parking policies with congestion charging policies; concepts of speed moderation; traffic management in the environment improvements; dynamic allocation of lanes (59)

### **B3 Sustainable strategies - Institutional Aspects**

- Assessment of good practice in the increasingly complex institutional arrangements concerning transport policies in urban areas is needed – division of responsibilities between local, regional, national and multi-national authorities, different levels of authorities having different responsibilities in different countries, increasing competition, more public input into transport policy etc. (12)
- A good urban policy should consist of coordinated elements, working together to produce long-term effects, including combination of pricing policies for car users and PT fares, investment programmes for better PT and land use planning (13)
- The involvement of key stakeholders (general public as well as public and private bodies) is very important – from people feeling involved at the design state, through sharing costs and developing working relationships during implementation, to successful launch and agreements for future collaboration (17)
- Maintain strong project management from part of the local authority, a strong local government with a clear vision on sustainable transport cannot be underestimated (17)
- Restrictions, car-free zones and strolling zones can lead to less traffic, improved mobility, less noise, higher life quality, more accessible and attractive city centre, gain approval for them by politicians and citizens (17)
- Allowing fairly only new vehicles and no trucks in environmental zones will reduce emission and fleet (17)
- Local authorities are key players for promoting clean vehicles, private fleets can follow (17)
- Cities and regions need greater flexibility in public procurement and state aid law, authorities have the right to decide for themselves how services of general (economic) interests are provided (27)

### **B4 Sustainable strategies - Environmental Aspects**

- already many available clean PT vehicle technology – but in practice high competition between clean technologies and less pollution diesel technology (7)
- Rather many needs in terms of technical developments to reduce the noise levels of PT (7)
- Open research aspect: cleaner vehicles, alternative energies, efficiency increase, lighter material, optimised braking etc., recyclable materials, noise reduction, new funding rules for environmental-friendly applications (19)
- Cities have an important role in combating climate change, they have the ability to generate changes in a large scale for example in areas such as public transport, therefore an environmental requirement has to be introduced to the structural funds program (27)
- New non-polluting and energy efficient vehicles
- Policy strategy to deploy private sector Alternatively Vehicles (AFVs)
- Biogas and captive fleets
- Joint procurement of AFVs (46, S. 3)

- Noise abatement on the local level: road surface, vehicles, traffic management and traffic data, annoyance and health aspects and the need for an integrated approach (52, S. 3)

#### **B5 Sustainable strategies - Freight transport**

- Not standardized and not transparent inter-modal transport market for freight (16)
- knowledge about optimal transport-data sharing structures for Urban freight logistics - traffic management is an important part of optimised urban freight transport. (16)
- freight is often overlooked in urban transport planning, but has an important contribution both environmentally and economically (12)
- freight needs to be more often integrated in integrated strategies to improve urban transport and freight planning needs to focus on the promotion of efficient access, removal of heavy vehicles from sensitive areas, and transshipment facilities to support more environmentally sensitive modes (12)- comment: financial incentives and push?
- Experiences of on-going strategies, concepts and activities for urban freight transport have been collected from European cities (delivery solutions, market initiatives, environmental initiatives, land use and infrastructure) (13)
- Open research aspects in freight transport are: urban freight transport planning, cost effective innovative vehicle technology for city distribution, facilitation of cooperative distribution implementation, cost effective urban intermodal transport, cost effective ICT applications for distribution network optimisation, competitive alternative fuels, effective combined passenger and freight transport concepts (13)
- For sustainable urban freight transport it is hard to find a solution, success depends on managerial and organisational performances that reach the market and find local consensus, uniform and smaller containers seem to be a clue (16)
- Too little emphasis on market mechanism and free entrepreneurship in urban freight distribution (16)
- Solutions will only function without involvement and subsidies of the state (16)

#### **B6 Sustainable strategies - Economical Aspects**

- Knowledge on PT market, users satisfaction and customer's perspective – lack of using and comparing survey results (7)
- Lack of integrated marketing strategies esp. in smaller countries (7)
- Unclear allocation of subsidies in competitive market (7)
- Fear and insecurity of PT operators regarding open and more competitive markets (7)
- Lack of reliable and sustainable operational financing models in Central and Eastern European countries (7)
- Investments in surface transport with priority are more efficient than underground public transport, improvements reuse of existing rail routes are more efficient than newly built routes (13)

- The main issues in implementing urban road pricing have been investigated on basis of case studies presenting different stage of development, analysed legal, financing and organisational issues, marketing and press coverage and technologies (13)
- Pricing schemes showed benefits in congestion reduction and environmental impacts, but acceptability is a main concern, strategies which explain the pricing and benefits are needed (13)
- Support development of new methods concerning cost-benefit analysis, also taking soft parameters into account (17)
- Fare policy: lack of clarity concerning objectives of the fare policy (vague terms); general movement towards fare integration and the use of smart card (obstacle: transition costs), large potential for improvements; public compensation for public service requirements and concessionary fares are present in all networks; specific tax revenues (congestion charge) for PT funding is not widespread, but congestion charging is showing positive results (32)
- public private partnerships are not widespread, despite their potential for efficiency improvements (32)
- barely examples of land value captures (as investment in PT can have a positive impact on land values) (32)
- no clear link between fare structure and regulatory time (32)
- regarding cost reduction efficient fleet maintenance policy, an active resource management, monitoring and information management is important (32)
- impacts of financial public transport indicators are very little (in catchment area revenues increase, but cost increase is limited) (54)
- Open research: more detailed assessment of competitive tendering forms that could be applied to urban transport; deeper exploration of the link between organisational and regulatory structure; exploration of measuring consumer surplus within the trade-off between efficiency in production and consumption [supply side: cost reductions or increase of profits; consumer side: increase in passenger kms?] (41, S. 3)
- Transport system investments have an effect on real estate prices and rents [they are increasing] (53, S. 5)

#### **C1 Urban transport supply side - integrated and harmonised services**

- Lots of experiences but still remaining difficulties with revenues distribution as part of integrated tariff and ticketing systems (7)
- Innovative mobility services (e.g. car sharing and demand responsive transport services) are often not flexible enough – operators do not feel competent and enthusiastic about providing these services (7)

#### *ITS for PT*

- Lack of standardisation for interoperable smart card tickets (7)
- Various projects and implementations in several countries with different electronic ticketing / fare management options: contactless smart-cards or disposable paper tickets with electronic chips, systems requiring check-in and/or check-out actions, manual ticket selection, integrated electronic bank purses, inter-services (such as



- access control, parking payment, museum entrance), electronic use devices for long-range technology, mobile phones (10)
- Very important for automatic registration and fare calculation – user want to be informed –requires display (10)
  - SMS-based ticketing provides a modern image of the operator and may attract new costumers (10)
  - No future prospects are seen for electronic contact-based technologies (not suitable for a high passenger throughputs) (10)
  - proximity technology is used in most applications today and has proven a mature technology (short transaction times, mainly suitable for closed systems) (10)
  - vicinity technology, although tested in laboratories, has shown no satisfactory results regarding high and reliable detection rates (necessary door antennas require high installation efforts and mechanical adjustments, fixed maximum field strength by law limits transmission distance), might be used in combination with manual ticket selection for data collection for statistical purposes, not for automatic fare calculation (10)
  - long-range technology, specially designed for automatic fare calculation in both closed and open systems, has been successfully demonstrated in CH (user device of smart card format, no user actions required but possible, therefore especially suitable for handicapped people, detection rate is sufficient high; drawbacks: currently proprietary technology, user device still too expensive ) (10)
  - SMS/ Internet/ WAP technology limited to users that are willing and physically able to use, implies manual ticket selection, automatic fare calculation not possible (10)
  - acceptance of technology/ preference of devices will vary according to target/ user group (frequent/ occasional customers, elderly/ young, handicapped/ not-handicapped)
  - operational management systems are mostly only monitoring and providing real-time data information to passengers, limited interaction with fare collection systems (10)
  - ITS potentially provides a wide range of new, more flexible opportunities for mobility-impaired people, but integration in existing offers is still limited (10)
  - GPS localisation technology/stand-alone GPS is usable for most purposes in PT (10)
  - Research has assessed travel behaviour, user acceptance and implementation for combination of internet- based public transport trip planner with different transport services, the result was a reduction of 10% of car use (13)
  - Research concluded that integration of the trip planner with car travel information should be contemplated because this offers advantages of PT to car-oriented users (13)
  - With easy and integrated ticketing with smart card systems, Park & Ride facilities, secure parking places for bikes, real-time information systems at stations and web-based trip planning PT would be more attractive (17)
  - Communication, information and marketing are important when trying to increase use of PT and other modes of sustainable transport, soft measures are

inexpensive and efficient, especially when combined with infrastructural investments (17)

- For increasing cycling in cities soft measures (e.g. marketing, education, campaigns, information on the internet) and hard measures (B&R, bicycle lanes, sheltered and protected cycle racks close to metros, bus and train stops) are successful (17)
- Open research aspect: fleet and personal operation-flexible, dynamic adaption. Dynamic business and pricing models (19)
- To encourage walking: ensure that different amenities can easily reached by food, provide and maintain adequate lighting in public areas, improve home delivery services, introduce traffic calming in areas with mixed traffic, increase the number of car-free zones (30)
- To encourage cycling: develop road infrastructure which gives higher priority to cyclists, promote cycling as a convenient, efficient and environmentally friendly mode of transport, provide bicycles at places of work, provide city bicycles free of charge, introduce “call-a-car” schemes, introduce new types of cycle racks and storage’s, introduce bicycle registration programs (30)
- Discourage driving by: giving cyclists and pedestrians priority, increase number of parking places for bikes and decrease number of parking places for cars, make people more aware of their own contribution towards the creation of a sustainable society, use the media to increase the status of walking and cycling (30)
- Open research aspects: business models for TTI (traffic and Traveller Information services in Europe), multiplication of media/device for TTI, adaptive traffic systems, use of floating car data, use of floating car date, also coupled with road pricing infrastructure, intelligent vehicles and infrastructure, cooperative systems, urban and interurban TTI interfaces, integration of PT and urban road traffic information, dynamic routing/ integrated road traffic information in the journey planner, information for mobile phone users (31)
- Flexible collective transport (demand responsive transport services, flexible transport solutions FTS) will have a role of vital importance for sustainable urban mobility (improvement of quality of life for some groups of population, allowing access to services and entertainment, reduction of traffic impacts on environment and health with decrease of private car use) (34)

#### *ITS for PT*

- Open research aspect: Innovative use of ITS to better operate PT (19)
- Car sharing: open ends for car sharing without the need of stating the returning time by reservation; instant access to vehicles, means using a Car-Sharing car without the need of reserving it; one way rides; better management of vehicle fleet
- Gap: cash car, used only by a very few consumers. Work on making this system more attractive and competitive (45, S. 3)
- New seamless mobility services:
- Urban lift sharing services
- Public bicycles
  - Call-a-bus-service (46, S. 3)
- Innovative approaches in city logistics:
  - Space management for urban delivery

- Inner city night delivery
- Home delivery using locker boxes (46, S. 3)
- (46, S. 3) → open research concerning recommendations on the strategic and thematic level; research gaps

## **C2 Urban transport supply side - integrated and harmonised systems**

- Open research aspect: Research into automation in road transport has provided a comprehensive review of the status and the expected development (technical and non-technical perspective of the innovations) (ADAS, PRT, CTS) (13)
- Development of GPS-based systems which can implement distance-based pricing allowing higher flexibility is required (13)
- With traffic management systems, existing infrastructure is used more efficiently, is good for reaching goals regarding congestion, emission and traffic volume (for example well tuned traffic signals, traffic signals giving priority to PT) (17)
- Open research aspect: PT design – harmonisation and innovative design (19)
- Open research aspect: automatic fare collection based on innovative fare systems and integrated tariffs(19)
- Investments can cause changes in economic and spatial development; effects: migration to rural, motorways attract car oriented services, bicycle infrastructure → keeping residential population in the area (53, S. 5)
- Investments in light rail systems are more cost efficient than investments in conventional railways (53, S. 5)
- Investments in bicycle traffic with inter-modal interfaces (e.g. bike & ride) are highly efficient
- Investments in surface public transport with priority route are more efficient than investments in underground public transport (53, S. 5)
- Further researches needed for:
  - architecture of systems
  - Geo referencing, digital maps, use of Galileo
  - seamless services (incl. their availability for a large public, ICT)
  - vehicle road and vehicle- vehicle cooperation
  - interoperability of different systems and the standardisation process (59)
- Further actions are required in the assessment area and in the training area for the professional and the public at large (59)

## **D1 Safety and Security**

- Significant ITS infrastructure usable for safety and security reasons is already in place, mostly used for ITS service and information applications, also supporting non-ITS elements are already in place (staff, training, mechanisms, ...) (10)
- Successful and reliable image analysis techniques, but still to be further developed
- Many applications for safety and security implemented in general transportation can be transferred to PT (10)
- No special consideration of the safety and security needs of either disabled persons or of the elderly by ITS applications, their needs have not been taking

into account when designing services for general use. But they are the vulnerable sections of society (10)

- Problem of devolution of responsibilities for ITS applications concerning Safety and security - discontinuities of authority, responsibility or collaboration (10)
- Open research aspect: safer vehicles, improve personal security, European PT security legislation, standardisation and certification, better integration of safety and security concerns in design of infrastructure, safer accessibility for persons with reduced mobility, emergency management (19)
- To decrease the number of accidents of cyclists and pedestrians: 1. Parking restrictions – ban parking near cross roads, enforce parking restriction on pavement; 2. light signals: introduce green arrows for turning cars and separate cyclist signals, stop use flashing lights; 3. Cycle paths and cycle lanes – separation of road users through the use of special painted bicycle lanes and carriage way at different level, speed controls, bus and tram stops with higher visibility, (30)

## **D2 Comfort, Quality**

- Staff is of special importance for improving the service of PT (7)
- Passengers of PT strive for smooth and few interchanges, measures developing this are vital in order to make PT more attractive (17)

## **D3 Accessibility, Rights, Equality**

- No ITS systems for Safety and Security have yet exhibited signs that they could create barriers for the traveller or lead to social exclusion. However, image-based techniques may be deemed to invade privacy. (10)
- User interest about integrated fare structure, but using smart card technology is related to some uncertainty and fear of users concerning data protection (7)
- Analysis of effects on social equity of road pricing and other pricing tools (costs for parking, for PT etc.) is missing (13)

## **D4 User Behaviour**

- Lack of knowledge about the effects of information services on traveller's behaviour (7)
- Lacking knowledge concerning perspectives of non-users of PT and their barriers (7)
- Habit and perceived behavioural control influences the prediction of walking and cycling (30)
- Most important reason for walking is distance (acceptable length is around 1 km (30)
- Most people think positive about walking
- A lack of safety is a factor why people are negative about cycling in some cities (30)

- Main factor which appeared to encourage the use of the car was comfort, many car drivers think driving is relaxing, that it increased their sense of freedom, that it isn't time consuming (30)
- Consider in all developments that you have to move as pedestrian and not only as a car driver (49, S. 4)

## **6. Conclusions and Recommendations**

(in process)