



URBAMOVE

URBA_n MO_bility initiative

ECTRI's STRATEGIC RESEARCH AGENDA FOR URBAN MOBILITY IN THE EUROPEAN UNION



May 2005

REPORT ECTRI number 2005-06

The ECTRI Working Group on Urban Mobility has been created on November 12th, 2004 at the Crowthorne' Assembly of members further to INRETS initiative, with the following aims:

- To define a working programme in this area for actions at short, medium and long terms,
- To prepare by May 2005, as first action, a Strategic Research Agenda on Urban Public Transport Mobility to be presented at first place at the 56th UITP World Congress and Mobility and City Transport Exhibition at Rome in June 2005.
- To propose some common reflections about research needs in urban mobility to European, National and Regional Institutions.

In accordance with these terms of reference, this first action has been undertaken and the working group has prepared URBAMOVE – Urban Mobility Initiative which proposes a Strategic Research Agenda for Urban Mobility in the European Union.

The research themes developed in this document provide an input to complement the strategic research agendas of existing technology platforms. Whereas specific highlight is given to public transport, the research themes listed hereafter apply to all urban modes, motorised or non-motorised, with a view to bring global solution to urban mobility problems.

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Table of contents

Introduction.....	4
URBAMOVE-Urban mobility essential research areas.....	6
<u>THEME 1: IMPROVING MOBILITY IN URBAN/PERIURBAN AREAS</u>	<u>7</u>
1.1 Dynamic efficiency: forecasting mobility solutions, adapting to changing demand.....	7
1.2 Intermodality/interoperability	8
1.3 Best modal choice promotion	9
<u>THEME 2: ECONOMICS, REGULATORY AND INSTITUTIONAL ASPECTS</u>	<u>10</u>
2.1 Economics.....	10
2.2 Regulatory/institutional aspects.....	11
<u>THEME 3: LAND USE.....</u>	<u>12</u>
<u>THEME 4: SOCIAL ASPECTS.....</u>	<u>13</u>
<u>THEME 5: DESIGN AND TECHNOLOGY OF PUBLIC TRANSPORT</u>	<u>14</u>
<u>THEME 6: INFORMATION AND COMMUNICATION TECHNOLOGIES: WHAT INNOVATION IN URBAN/PERIURBAN AREAS? WHAT EVALUATION?</u>	<u>16</u>

Introduction

I/ **Research in transport** is conducted and addressed in Europe by different type of stakeholders (EU, states, research institutes, transport companies, manufacturers ...). All agree to consider that intermodality, multimodality and integration play a central role to achieve efficient transport systems and mobility schemes in urban areas. Trip optimization obviously needs a good combination of various individual and collective transport modes.



In studies and research conducted at the European level, a pregnant problem is that the *urban multimodal issue* is frequently addressed in a modal approach, with little consideration for the complementary modes, hence an inadequate treatment of modal complementarity.



A second concern regards the confusion frequently made between *urban mobility and subsidiarity* principle. The link between urbanization and European demography is well known- as is the dependence of urban areas to the economic growth and the societal development.

This being said, and even if some related issues could be solved at a national or local level, urban mobility is a European concern, at least for the following two reasons:

- the necessity to harmonize system components in order to reduce supply costs;
- the necessity to harmonize (or make compatible) traffic information and operating rules to facilitate trips and ensure a fair opening of the public transport markets.



Thirdly, although appearing in different sizes and type of implementation, *European urban areas* share a characteristic structure in settlement densities and distributions, architecture, cross sections capacity, degree of modal interdependencies etc. Although each and every urban development and mobility scheme is specific, one might be able to talk of a “typical” European City, requiring typical (public) transportation system designs – for example in comparison to Asian or North-American conurbation.

II/ **Having considered this inadequacy**, the need for an adapted research agenda in the field of urban mobility is becoming more stringent taking into consideration the following elements:



Public transport systems are not like before anymore.

European clients (local authorities and passengers) are more demanding. New transport systems, and especially guided ones, are being developed in shorter time with a large heterogeneity, and still high application-dependent engineering. In usage in some cities today, these new systems will be adopted by many more in the coming years. They integrate new information-technological components and systems, new energy combinations, new energy distribution systems, new guiding mechanism, new electronic ticketing structures and the like.

At this stage there is a strong need for the concerned stakeholders to come together to deal with questions such as safety or security, standardization or systems evaluation. There is room for pre-competitive research in this field, and for win-win relationships - but the research objects first have to be clearly defined (the European project MODURBAN being a good example).

⇒⇒⇒ Cars are not like before anymore.

A lot of research is being done around cars and their new technological developments. However, there is a need for more research focusing on car and its urban environment. All research entry points are valid here: socio economics, energy, environment, space use, passive and active safety, etc.

⇒⇒⇒ Public transport, and especially buses, has to be upgraded

The customer should become the central focus and public transport should be more personalised. This request to think not only in terms of systems and modes but also on tailor-made new product or formulas, supported by a variety of new services. For example marketing (image, design, comfort, price differentiation, 'emotion' aspects...) product-innovation, financing and management are important aspects to study. Car industry is very innovative, and constantly in search of urban customers satisfaction. Meanwhile, buses and bus systems have not improved enough. Bus Rapid Transit projects, and the introduction of new design and new services on the bus system should be given a high priority.

⇒⇒⇒ Urban mobility is closely linked to local economy

Transport activities and services have an impact on the land value (and therefore on tax issues), and they also have an impact on companies and home localisation. These impacts need to be analysed, measured and evaluated in a global approach that would be able to integrate the various stakeholders' interests: local authorities, companies, tax payers...

Seeing other people is also an important reason for mobility. Therefore, to estimate the future needs for public transport services, not only migration and demographic trends need to be studied but also the development of social networks. Elderly and tourists might be more specifically focused on.

⇒⇒⇒ Competition is there

From an institutional point of view, public transport organization is at a crucial point of its evolution with a regulation on competition about to be approved in Brussels.

Competition between public transport operators is already there, or will come soon. There is an urgent need to collect and analyse data on this issue, bearing in mind that efficiency, quality and accessibility should govern transport systems. One crucial point will be, for local authorities in charge of transport, to be able to preserve their choice of an integrated transport network- that is to say a network with modal complementarity, as opposed to unorganized modal competition.

III/ It is felt by ECTRI that after many purely technological EU funded projects in the automotive sector a new research agenda needs to be defined at European level to reflect more on intermodal aspects such as cooperative transport and traffic, city management, tolling and investing strategies in multimodal European cities, new transport approaches (public cars?) etc.

This is why ECTRI has taken the present initiative. The aim is to list a series of research thematic in the field of urban mobility that are deemed essential by European transport researchers in order to ensure the soft running cities of tomorrow.

To deal with the hereafter listed research themes in the general interest, ECTRI would like to underline that:

- a European vision of urban mobility should be made very clear and coherent with other European rules, for example those ensuring the competitiveness of European companies on the international scene.

- there should be some regular evaluation of what has been achieved (every 5 years ?) and the findings have to be taken in consideration for the follow up.

URBAMOVE

Urban mobility essential research areas

The research themes developed hereafter provide an input to complement the strategic research agendas of existing technology platforms. Whereas specific highlight is given to public transport, the research themes listed hereafter apply to all urban modes, motorised or non motorised, with a view to bring global solution to urban mobility problems.

Theme 1

Improving mobility in urban/periurban areas

1.1—Dynamic efficiency: forecasting mobility solutions, adapting to changing demand

⇒ Thematic priority 1

More comprehensive mode choice models

Most of the research in mode choice behaviour focuses on short term or day-to-day decisions when there is a need to frame the transport demand of tomorrow, to give guidance on transport innovations. Discrete choice modelling is based on the concept of rational choices and usually monetary costs and travel time are considered the most relevant influencing variables for mode choice. On the other hand long-term decisions about car ownership and season tickets are not very well understood as well as attitudes in favour or against certain transport modes and the influence of changing preferences (for example the choice of a place of residence) in different stages of life.

⇒ Thematic priority 2

Impact evaluation of public transport services and public transport improvements on mobility. *What are the criteria and the indicators in the evaluating process?*

Traffic policy and decision makers need information about the impacts of the measures and efforts which have been done to improve public transport services. Research is needed to specify right criteria and indicators in the evaluating process and the methods to assess impacts and further indicate the impacts on mobility, environment, the community as a whole and the citizens. Economical and quality impact must be evaluated in favour of the user, not only of the operator.

⇒ Other important research subjects

- ✓ Investigation of the impact on citizen behaviour and traffic conditions of a variety of public transport improvement measures, sociologic studies on transport needs and their evolution - meaning better understanding of why people should use or not use public transport in the future.
- ✓ Contextual background and likely future conditions: demographics, societal development, implications of land-use trends

1.2—Intermodality/interoperability

⇒ Thematic priority 1 Network optimization

A lot of work is being done to optimise modal networks (rail, buses, cars...), but the multimodal optimization of a complete network is quite a complex scientific question, and is not enough addressed. For example while one of the great problems in large urban areas is the high level of congestion in the close suburbs, this is often the result of a lack of optimization between the road network and the public transport system.

⇒ Thematic priority 2 Optimisation of the interchanges, including information facilities. This should also include optimization of the links between transport services (public transport, cars, bikes...) and traffic networks (infrastructure...).

⇒ Other important research subjects

- ✓ Freight transport and public transport: how to get the best from the network without impeding mobility. What innovative solutions?
- ✓ Intermodality between public transport networks and non motorized modes. *This can include physical facilities and information systems for the whole trip, from door to door including departure and destination points but also interchanges. This should give a special focus to the accessibility of public transport networks for non motorized modes.*
- ✓ Coordination between mobility managers (car-sharing, park and ride, car pooling, kiss and ride...)
- ✓ Optimization of “Kiss and Ride” in order to facilitate public transport utilization
- ✓ Intermodality between buses and guided systems (tram, metros, tram-trains, rail cars)
- ✓ Optimization of Park-and-Ride systems (*including both cars and bicycles*) in particular for commuters to and in urban/periurban areas (in relation with “mobile information” in theme 6). *Reduction of intermodality barriers. This includes the optimization of location and size of the interchange stations, in order to minimize perverse effects.*
- ✓ Long distance commuting trips. *Fast train connections make the distinction between long distance trips and short distance commuting questionable. On the other hand, it is still seen as an advantage of the car that it can serve as a means of transport in the destination area of a longer trip. It has to be addressed, how PT and intelligent combination of mobility services can invalidate this line of argument.*
- ✓ What parameters and what definition of an “acceptable walking distance” to reach the public transport system? *Including focus on elderly.*

1.3—Best modal choice promotion



Thematic priority

Impact of awareness campaigns and alternative marketing ways in order to promote public transport and alternative transport modes. This should include a study of the impact of different campaigns for different social groups and their effectiveness.



Other important research subjects

- ✓ What technical tools to understand and facilitate modal choice?
- ✓ More specific demand: investigation of rail bonus and other specific mode demand
- ✓ Specific mobility requirements of different social groups: elderly, families...*How to bring/keep them to public transport?*
- ✓ Door to door solutions for mobility impaired
- ✓ Car sharing organisations. *Development of vehicles and car use/car ownership organisation systems adapted to urban/periurban areas.*

Theme 2

Economics, regulatory and institutional aspects

2.1—Economics



Thematic priority 1

Land value capture: how to evaluate, capture and invest it in public transport?



Thematic priority 2

Investigation of alternative funding schemes towards reduced congestion and more environmental friendly public transport



Other important research subjects

- ✓ Pricing/fares structure of public transport: how to differentiate trips by distance, by social groups, by time-of-day...
- ✓ Life cycle cost optimization of particular public transportation systems (tramways...)
- ✓ Interactions between road pricing and public transport. *Road pricing as a measure to alleviate congestion in city centres and on heavily used roads is intensively discussed. However, road pricing policies should include measures on the PT side. Travellers must be aware of alternatives.*
- ✓ Effects of heterogeneous vehicles within a given fleet: on maintenance, on operation, on usage and user perception
- ✓ New fares or pricing options: what innovative pricing solutions? *Pay as you drive?*
- ✓ Financial resources, such as public private partnerships, taxes...
- ✓ Revenue funding for on going operations (as opposed to capital funding)
- ✓ Development of comprehensive economic studies on externalities of urban transport projects
- ✓ Definition of harmonised criteria for impact assessment at European level
- ✓ Interactions between pricing and funding

2.2—Regulatory/institutional aspects

⇒ Thematic priority 1

Opening up of public transport market

Introduction and comparisons of transport systems based on case studies – in house operations, privatisation, subsidy, franchising, quality tendering, regional/local influences and interactions

⇒ Thematic priority 2

Impact of parking policies on mobility systems

⇒ Other important research subjects

- ✓ Parking policies and work places: what incentives? What constraints? This should take into account the differences between public and private parking places on work places.
- ✓ Stakeholders involvement in the mobility service: what cooperation between the different actors to deliver the best service for the traveller?
- ✓ Definition and optimization of technical and operational interface between infrastructure providers and operators.
- ✓ Innovative solutions for governance of urban transport systems. For instance, would it be useful to isolate the management and operation of the roadway network in a multimodal perspective (since it accommodates pedestrians, bicycles and buses as well as cars), from the representation of car users' interests.
- ✓ Creating incentives for innovative mobility providers to enter the market
- ✓ Managing numerous operators on a market: what cost? What cooperation between competent authorities?

Theme 3—Land use

⇒ Thematic priority 1

Interactions between land use, traffic and public transport networks

Concepts for a sustainable land use in different European regions and cities. This should include, for example: increase the share of public transport, walking and cycling, decrease the use of cars, reduce traffic volume, saving green spaces for construction... This should also include transport demand and its interactions with land use and public transport networks.

⇒ Thematic priority 2

Land use and traffic in cities and regions – integrated planning

Land use and urban planning have a key and long lasting influence on the mobility need. This is especially true in areas with economic growth and on transportation of people and goods. There is also an influence on the environment and a strong economic impact. This is why there is a need for:

- ✓ *an analysis of the cost of urban sprawl and of external framework (traffic priority, city centre parking, road pricing...) in relation with public transport*
- and for:*
- ✓ *an analysis of the relationships between land planning, urban development and development of traffic.*

⇒ Other important research subjects

- ✓ Understanding mechanisms influencing people and firms preferences for places
- ✓ Impact of commercial activities inside public transport networks: how to improve economic balance and attractiveness of public transport?
- ✓ Public transport planning and settlement choices: how to take one another into account
- ✓ Travel modes and space consumption

Theme 4—Social aspects



Thematic priority 1

Safety and security of the mobility system

This remains a major issue for public transport. It should also include terrorist events and disaster management



Thematic priority 2

Impact of public transport on social equity

Public transport is generally considered as bringing a social service to people that needs it. Does public transport really play this role? It is to be checked. Fare systems are often in favour of people living in inner cities - meaning financially able to live there. Compared to revenues, transport cost is often very high for those living in far suburbs. The social impact of urban sprawl and the way to bring more social equity through the organisation of the network and its fare system should therefore be much more studied.



Other important research subjects

- ✓ Organisation of workers and labour in public transport companies
- ✓ System social optimization: fares, frequency, schedules...
- ✓ Impact of ICT on travel behaviour e.g. how is the growth in internet shopping changing travel behaviour?
- ✓ The impact of lifestyle changes and life stages on travel behaviour

Theme 5

Design and technology of public transport



Thematic priority 1

Energy and environmental issues

This should especially includes some research in the following areas:

Alternative fuels -Lower energy consumption solutions - Emission control - From wayside energy distribution to autonomous on board energy supply - Hybrid motorization for urban vehicles.



Thematic priority 2

Bus system improvement

During the last decades, car industry has really improved its products, for the great satisfaction of car users- even in congestion driven cities. Buses did not improve at the same speed, and the lack of quality, in comparison with cars, is now quite obvious.

After a successful upgrade of light rail systems, upgrading buses (for example via the “Bus Rapid Transit” concept) should become a priority. There is room for technology transfer from car industry, and new ways to design buses should be promoted, to increase their attractiveness.



Other important research subjects

✓ Automation of transport systems and processes

- This is necessary to complement system driven approach, specially in order to introduce new transport (sub)system concepts to enhance public transport in a more economical and sustainable way.

✓ Guided systems

- Adequacy between urban guided systems design and line characteristics in order to optimize costs
- Safety, evaluation and certification harmonisation in guided public transportation
- From steel rails to optical rails: new developments in guidance technologies
- Smaller guided vehicles and PRT
- Guided systems sites analysis (safety, traffic management, spatial design, ...)

✓ Components

- Integration of hi-tech systems in the vehicles in order to reduce accident rates and better coordinate the vehicles schedule in the overall urban transport mobility system.
- Integration of new components (motorization, energy, guidance, automation ...) in order to reduce investment and/or operation costs, and/or improve performances
- Noise pollution and vibration should be addresses while upgrading components

✓ **Quality factors**

- How to make public transport services more customer oriented to make them more attractive
- Comfort and accessibility of public transport vehicles
- User perception of 'seamless' trips

✓ **Network on new approaches** for example systems between bus and tram, between automobile and *minibus* etc.

✓ **Industrial organization of public transport vehicle production**

Prospective on the industrial organization of public transport vehicle production in Europe. This should include a study of social impact

✓ **Incident management systems**

Development and implementation of incident management systems in public transport services: technical and institutional approaches.

Theme 6 - Information and communication technologies: what innovation in urban/periurban areas? What evaluation?

⇒ Thematic priority 1

Evaluation of the existing information system technology and centres

A lot of innovative systems have been promoted and implemented in the past ten years. It gives the feeling of a great profusion. But are we sure that this was globally efficient, considering the aim of an increased public transport patronage? It is obviously necessary to take time to make an in depth evaluation of existing systems, and to promote a best practices policy.

⇒ Thematic priority 2

Dynamic mobile information

Development and implementation of customised dynamic mobile information about urban public transport. Particular attention should be paid to the acceptance of such systems and to the behavioural change initiated by them, discussing also the question who are the users of these systems and which users are excluded when these kinds of systems are implemented. Specific focus should be given to dynamic personalized mobile information.

⇒ Thematic priority 3

Implementation of information and communication technologies inside interchange stations

This deals with studying the combination of intermodal information by means of new technologies, including real time information and classical information, on various physical supports. This should also includes the integration of specific needs for particular user categories (disabled people, cyclists...) and the management issue.

⇒ Other important research subjects

✓ **Ticketing**

- Ticketing systems and fare policy; integrated tariff systems, innovative ticketing systems including data collection of travelling and operating, and integrated ticketing and information systems. This includes multimodality issues, parking and road pricing.
- Collection of data from new ticketing systems and its use for benchmarking performance, financing and costs of public transport in different cities and regions. The data collected might also be used to develop planning and information systems.
- New electronic (multipurpose) ticketing for European cities: state of the art, new systems, demonstration, standardization, implementation.

✓ **Most effective content of information services to travellers**

- ✓ **What integration, for which information system,** in order to improve the system?
Scheduling systems, city information system, tourist information systems, traffic light control and passenger announcement systems.
- ✓ **Cost and benefits of standardization.**
 - Development and validation of standards for public transport
- ✓ **Real time tracking and imaging** of traffic/transport situations of all modes
- ✓ **Validation of various ICT initiatives** for complete travel journeys by the passengers (intermodal urban transport).
- ✓ How can ITS and transport and traffic management systems **improve accessibility?**

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