

Programme: EESD-2001
Key Action: City of Tomorrow
Task: 3.1



PLUME

PLanning and Urban Mobility in Europe

**DELIVERABLE 11:
Final Report**

Project Contract No: EVKA-CT-2002-20011

**Final Version
September 2005**

Programme: EESD-2001
Key Action: City of Tomorrow
Task: 3.1



PLUME

PLanning and **U**rban **M**obility in **E**urope

**DELIVERABLE 11:
Final Report**

Project Contract No: EVK4-CT-2002-20011

Authors: Sarah Clifford, David Blackledge (TTR)
Tony May, Ann Jopson (ITS)
Carlo Sessa (ISIS) and Sylvain Haon (POLIS)

CONTENTS

0	EXECUTIVE SUMMARY	5
1	INTRODUCTION	9
2	USER NEEDS ASSESSMENT	14
2.1	METHODOLOGY	14
2.2	SYNTHESIS OF END USER NEEDS	15
2.2.1	Target Audience for LUTR Research	15
2.2.2	Type of Research	15
2.2.3	How problems can be tackled within PLUME	16
2.2.4	How solutions can best be used within PLUME	16
2.2.5	Critical Process Steps	16
2.2.6	Benchmarking	17
2.3	BARRIERS	17
2.3.1	Institutional Barriers	17
2.3.2	Political and cultural barriers	17
2.3.3	Financial Barriers	18
2.3.4	Physical Barriers	18
2.4	RESEARCH GAPS	18
2.5	CONCLUSIONS	19
3	STATE OF THE ART	19
3.1	INTRODUCTION	19
3.2	PROBLEMS AND CHALLENGES	20
3.3	POLICIES	21
3.4	PROCESSES	23
3.5	DECISION SUPPORT TOOLS	24
3.6	VISION	25
4	BENCHMARKING LUTR POLICIES	26
4.1	LUTR BENCHMARKING OBJECTIVES	26
4.1.1	Objectives 1-3:	26
4.1.2	Objectives 4 and 5:	27
4.2	URBAN TRANSPORT PERFORMANCE	27
4.3	INTEGRATED LAND USE AND TRANSPORT STRATEGIES	28
4.4	TRENDS ESTABLISHED THROUGH CROSS ANALYSIS OF URBAN TRANSPORT AND LAND USE STRATEGY IMPLEMENTATION INDICATORS ...	29
5	EXPLOITATION OF LUTR	30
5.1	STRATEGIC OVERVIEW OF NATIONAL SUSTAINABLE DEVELOPMENT STRATEGIES	31
5.2	TACTICAL ACTIONS AT COUNTRY LEVEL	38
5.2.1	Production of dissemination material and other activities	38
5.2.2	Exploitation of national and regional networks of public authorities and stakeholders	38
5.2.3	Organisation of PLUME national seminars	40
6	FUTURE RESEARCH NEEDS	44

6.1	THE IDENTIFICATION PROCESS	44
6.2	FUTURE RESEARCH NEEDS.....	44
6.3	CONCLUDING COMMENTS	50
7	POLICY IMPLICATIONS AND CONCLUSIONS	51
7.1	INTEGRATING LAND USE PLANNING AND TRANSPORT POLICIES FOR SUSTAINABLE CITIES	51
7.2	DEVELOPING A SOUND DECISION-MAKING PROCESS	52
7.2.1	Public consultation.....	52
7.2.2	Overcoming barriers – setting the right framework.....	52
8	CONCLUSION.....	54

ANNEX

0 EXECUTIVE SUMMARY

PLUME was a thematic network which ran for a three year period from November 2002 and dealt with issues connected with the integration of urban planning and urban mobility as part of the European Commission's research framework programme FP5 Key Action 4 'City of Tomorrow and Cultural Heritage'. PLUME built on the work of a number of RTD projects from Key Action 4 which addressed specific issues of Land Use and Transportation Research (LUTR). It also took into account outputs from a wide range of other national and international projects. In addition to synthesising the results from recent and ongoing LUTR projects, the key contribution of PLUME was to bring researchers and End Users together, with the ultimate aim of exploiting the results of the research quickly and efficiently in order to assist the sustainable development of cities throughout Europe.

The PLUME thematic network was organised into four groups; the Projects Group, End User Group, Advisory Group and Exploitation Group. The Projects Group, comprising coordinators or other key participants of LUTR research projects was responsible for the synthesis of project results, providing recommendations and the production of the State of the Art Reviews. The End User Group, comprising representatives of cities and city networks was responsible for identifying user needs and participated in a number of workshops. The Advisory Group comprised independent experts representing both Research and End User communities who were responsible for reviewing and commenting on the work of PLUME. The Exploitation Group comprised organisations able to act as national facilitators to reach out to End Users throughout Europe to promote implementation of best practices in LUTR to End Users throughout Europe.

A report on User Needs, Barriers and Gaps, produced at an early stage of the project, was based on the needs of the End User group of cities and highlighted research areas in the field of Land Use and Transport integration which the cities felt could be undertaken or exploited more effectively. The PLUME partners sought guidance from the End User group of cities in a number of ways in order to seek to identify the areas in which research in the field of Land Use and Transport Integration could be undertaken or exploited more effectively. Numerous lessons which fed into the work of the Projects Group were identified both through the End User needs assessment and the subsequent End User workshops. This continued interaction between the End User and Projects Groups enabled most of the interests of the End User group to be met.

The core work of PLUME was conducted by the Projects Group, which produced three annual State of the Art Reports to achieve the central objective of the network, which was to facilitate the transfer of innovation in the field of planning and urban mobility from the research community to End Users. The State of the Art reports conveyed a broad range of recent research findings, which were previously dispersed around multiple land use and transport projects, through a single outlet.

Each State of the Art report provided a synthesis of European research findings from the FP5 land use and transport research cluster of projects supplemented by pertinent information from other national and international research. The State of the Art reports make recommendations as to which policies, measures, and tools are best able to meet the need for sustainable development, taking account of user needs and barriers to implementation. The

work was undertaken by a group of experts involved in many of the projects considered. The reports are structured according to 23 “themes”, which were identified through discussions with End Users and taken from the conclusions of the PLUME End User needs report. Each theme is also addressed in more detail in a separate Synthesis Report, which presents all the relevant research from the land use and transport research cluster projects. The final State of the Art Review includes summaries of all of these Synthesis Reports, problems and challenges, policies, processes, decision support tools and a ‘Vision’ for a future European city.

A Benchmarking exercise was undertaken as part of the activities of the PLUME End User Group, and a report was submitted as an additional deliverable to the core actions. The primary aim of the exercise was to compare planning and urban mobility policies, measures and tools in the End User cities.

All End User cities were given the opportunity to participate in the benchmarking exercise and 15 of these cities provided data indicators relating to urban mobility and land use planning issues. The key findings from the PLUME benchmarking exercise provided information on urban transport performance; integrated land use and transport strategies and some trends were established through cross analysis of urban transport and land use strategy implementation indicators.

Three Exploitation Plans were produced by the Exploitation Group. These set out the overall PLUME exploitation strategy and then identified specific exploitation actions for promoting the good practice identified in the published PLUME State of the Art Reviews.

The Exploitation Group also took a strategic overview, by analysing and comparing the existing national or regional Sustainable Development plans in 12 countries and identifying to what extent and how these programmes address issues of relevance for Land Use and Transport Research (LUTR). In addition, the Exploitation Group also produced dissemination material including brochures which were produced in various national languages, newsletters, the LUTR web site and National Land Use and Transport Research guidelines which were published in the form of a book in national languages. In addition national and regional networks of public authorities and stakeholders were used to promote LUTR results and a series of national seminars were held throughout the course of the project.

While the land use and transport research programme has substantially increased understanding of the requirements for sustainable urban land use and transport strategies, several research needs remain and an ongoing part of the PLUME project was the identification of these research gaps and future research needs. Research gaps identified early in the project were addressed by including additional Synthesis Reports. When these were revised, they were updated to reflect the findings of the land use and transport research projects, and of related research programmes.

The remaining research gaps have been summarised and provide an outline specification for a future research programme. The first three gaps (human behaviour, technical performance and new trends) all help to increase our understanding of the fourth: land use – transport relationships. The last three gaps deal with ways of conducting, disseminating, and applying that research: research methods, political aspirations and professional applications. All of these seven domains are interdependent, and each draws on a distinct set of disciplinary

approaches. Any future research programme needs to integrate the contributions of these different disciplines into a truly interdisciplinary approach if it is to be successful.

Policy recommendations can be drawn from the analysis of the results of the LUTR cluster of projects. One important finding of many of the projects was that integrated land use and transport strategies are more successful than isolated individual policies in either field. Findings also include:

- Land use and transport policies are only successful in reducing travel distances, travel time and the share of car travel if they make car travel less attractive (i.e., more expensive or slower) and provide attractive land use alternatives to suburban living.
- Land use policies to increase urban density or mixed land use without accompanying measures to make car travel more expensive or slower have little effect as people will continue to make long trips to maximise opportunities within their travel cost and travel time budgets. However, these policies are important in the long run as they provide the preconditions for less car-dependent lifestyles in the future.
- Transport policies making car travel less attractive are very effective in achieving the goal of reducing travel distances and the share of car travel. However, they depend on a spatial organisation that is not too dispersed. In addition, highly diversified labour markets and different work places of workers in multiple-worker households set limits to an optimum coordination of work places and residences.
- Large retail and leisure facilities that are not spatially integrated increase the distances travelled by car and the share of car travel. Land use policies to prevent the development of such facilities ('push') are more effective than land use policies aimed to promote high-density, mixed-use development ('pull').
- Transport policies to improve the attractiveness of public transport have in general not led to a major reduction of car travel, attracted only limited development at public transport stations, but contributed to further suburbanisation of the population.

The successful implementation of policy recommendations often depends on the ability of decision-makers and of the decision-making process to integrate the elements necessary for overcoming traditional barriers to these policies. Social acceptance is vital for the success of many transport and land use policies and some actions need to be marketed to citizens. It is also necessary to implement frameworks which allow potential legal, institutional, financial, political and cultural barriers to be overcome.

The key conclusions from PLUME are summarised below.

1. Better communication of key findings from researchers to the ultimate decision-makers will be advantageous. PLUME has served this purpose by drawing attention to commonly understood findings, as well as to identify gaps and any inconsistencies in findings from research. A further step would be to address the particular research gaps identified by PLUME End Users by undertaking new research in the areas indicated in Chapter 6.
2. The inadequacy of real integration between land use and mobility planning has been evident for many years, and a number of barriers remain. Ideally integrating transport and

land use planning needs to be tackled at regional level first, before being tackled at a local (city) level.

3. It is the responsibility of national governments to ensure that regional land use and mobility planning systems are strong enough to achieve good vertical integration (consistency between local and regional plans) and horizontal integration (cooperation between local authorities within a region). The European Union should set the overall framework and establish standards for good practice.
4. It is important to increase the understanding of the public, politicians and the media about LUTR activities by directly involving them in future research programmes. In order to do this, a clearer and more tangible expression of transport and land use planning concepts and issues is required. In order to influence End Users, PLUME recommendations could be tied into existing European directives on the environment, or could be communicated in new ways, for example in the context of improving the health of citizens.
5. End User regions and cities should be involved in the process from the beginning in order to achieve a more integrated approach between land use and mobility planning. Demonstration projects are an important way of achieving this, but the research institutions are still key so that conclusions can be drawn from the demonstrations.
6. The End User cities participating in PLUME all agree that the network has been of benefit and that European cooperation and networking are positive aspects for improving knowledge and key to the success of achieving integrated policies. The End Users would like the work of the PLUME thematic network to continue and the momentum to be maintained.
7. While the land use and transport research programme has substantially increased our understanding of the requirements for sustainable urban land use and transport strategies, the barriers to implementing them and the potential benefits from doing so, several research needs remain. These are detailed in Chapter 6 of this report and provide an outline specification for a future research programme.
8. There are limited opportunities to continue further research in FP6, including an Integrated Project focussed on land use and a small Coordinating Action looking at scenarios for transport and land use. Furthermore, in order to continue the Benchmarking work carried out as part of PLUME, End User cities have been invited to join the third year of the Urban Transport Benchmarking Initiative to form a Benchmarking group focused on land use and mobility.
9. Whilst FP6 is not particularly relevant to PLUME, it is to be hoped that opportunities will arise in FP7.

1 INTRODUCTION

Within the European Commission's research framework programme FP5, Key Action 4 'City of Tomorrow and Cultural Heritage' addresses the European wide challenge to improve the quality of life in urban communities and the associated urban regions, and to ensure the competitiveness of European cities while promoting sustainable development assessed in economic, architectural, environmental, social and cultural terms. To tackle these challenges the objective of the key action is to improve forecasting, monitoring and assessment, and to establish and foster best practices, through a mix of RTD projects and accompanying measures.

PLUME was a thematic network which dealt with issues connected with the integration of urban planning and urban mobility. For a 3 year period from October 2002, PLUME built on the work of a number of individual RTD projects within the Key Action, each of which addressed specific issues of Land Use and Transportation Research (LUTR). PLUME also considered outputs from a wide range of other national and international projects.

As well as synthesising the results from recent and ongoing LUTR projects, the key contribution of PLUME was to bring researchers and End Users together, with the ultimate aim of exploiting the results of the research more quickly than would otherwise happen, so as to assist the sustainable development of cities throughout Europe.

The overall objective of PLUME was:

“To facilitate the transfer of innovation in the field of planning and urban mobility from the research community to End Users in the cities of Europe in order to improve urban quality of life”.

The Specific Objectives were as follows:

- To undertake a review of the needs of End Users in the field of sustainable urban development, land use and transport planning.
- To synthesise results of relevant national and international projects to meet the needs of End Users.
- To enable independent experts to review the applicability of the synthesised research.
- To facilitate inter-project discussions where results appear to be contradictory.
- To establish a system for benchmarking the success of implementation of the outputs of research.
- To present the synthesis of relevant projects to End Users and facilitate wider exploitation of the synthesis.
- To produce an annual State of the Art Review, providing a readily assimilated summary of best practice in the development of sustainable mobility in cities.

The objectives of the Dissemination and Exploitation aspects of the Project were:

- To disseminate effectively the results and solutions identified by the thematic network in a form suitable for specific user needs to a wide range of target groups throughout Europe.

- To develop and implement a PLUME exploitation strategy, whose main scope will be to facilitate the transfer of knowledge regarding suitable solutions from researchers to End Users.

When establishing a network combining researchers and End Users on such a complex topic as LUTR, which has a rich history of research and practical application with a very wide range of interested parties, it is important to create a framework that will work efficiently. Careful consideration was therefore given to the organisation of PLUME. The core consortium (which signed the contract with the Commission) was deliberately kept to a small group of four organisations. The members of the network were organised into four groups:

- The Projects Group, comprising coordinators or other key participants of LUTR research projects.
- The End User Group, comprising representatives of cities and city networks.
- The Exploitation Group, comprising organisations able to act as national facilitators to reach out to End Users throughout Europe to promote implementation of best practices in LUTR.
- The Advisory Group, comprising independent experts representing both Research and End User communities.

The core consortium was:

- Transport & Travel Research Ltd (TTR), the Project Coordinator, who also provided the main point of contact with the End User Group;
- Institute for Transport Studies, University of Leeds (ITS), which led the Projects Group;
- ISIS, Rome, the Exploitation Group leader;
- POLIS, responsible for Dissemination.

The network members were the following:

Projects Group

Most of the synthesis work was undertaken by Projects Group A Members:

- Institute for Transport Studies (ITS), University of Leeds, UK (Projects Group leader)
- CERTU, France
- ENEA, Italy
- LT Consultants, Finland
- Master Plan B.V, The Netherlands
- Spiekermann & Wegener, Germany
- STRATEC, Belgium
- Technical University Hamburg, Germany
- Technical University of Vienna, Austria
- Transport & Travel Research Ltd (TTR)
- University College London, UK
- University of Lund Sweden, Sweden

Additionally the Projects Group B Members contributed information from other projects:

- Factum, Austria
- ICLEI, Germany
- Nagoya University, Japan
- TIS (Consultores em Transportes, Inovação e Sistemas), Portugal
- University of South Australia, Australia
- University of Westminster, London, UK
- UPM (Polytechnical University of Madrid), Spain
- VTT, Finland

End User Group

- Aalborg, Denmark
- Athens, Greece
- Barcelona, Spain
- Brussels, Belgium
- Clermont-Ferrand, France
- Cologne, Germany
- Dresden, Germany
- Dublin, Ireland
- Gdansk, Poland
- Helsinki, Finland
- IMPACTS EUROPE (network of capitals and other large cities)
- INSULA (International Scientific Council for Island Development)
- Merseyside, UK
- Naples, Italy
- Rome, Italy
- Southwark, London, UK
- Stockholm, Sweden
- Suceava, Romania
- Surrey, UK
- The Hague, The Netherlands
- Vienna, Austria

Exploitation Group

- ISIS, Italy (Exploitation Group leader)
- ILS (Institut fuer Landes – und Stadtentwicklungsforschung des Landes NordrheinWestfalen), Germany
- Institute for Transport Economics (TOI), Norway
- National Technical University of Athens, Greece
- Swedish Association of Local Authorities, Sweden
- Technical University of Vienna, Austria
- TIS, (Consultores em Transportes, Inovação e Sistemas), Portugal
- TNO, The Netherlands
- Transport Research Laboratory (TRL), UK
- Trinity College Dublin, Ireland
- University Polytechnic of Madrid, Spain

Advisory Group

- City of Cologne (Barbara Moehlendick)
- City of Stockholm (Gustaf Landahl)
- Foundation for the Urban Environment (Pierre Laconte)
- Free University of Amsterdam (Peter Nijkamp)
- Joint Research Council (Laura Lonza & Hector Hernandez)

The core activity of the PLUME network involved an iterative series of steps:

- A periodic synthesis of research findings and case studies, with recommendations as to which policies, measures and tools are best able to meet the need for sustainable development, taking account of user needs and barriers to implementation. This work was undertaken by a group of experts involved in many of the projects under consideration (Projects Group).
- Review and comment by the Advisory Group.
- 3 editions of a State of the Art Review taking into account the comments of the Advisory Group and End User Group.
- Presentation of conclusions and recommendations to the End User Group at three workshops.
- Active exploitation of project results by the Exploitation Group.

In addition to these core actions, and to facilitate ongoing work in this field, the PLUME network undertook a benchmarking exercise to compare planning and urban mobility policies, measures and tools in the End User Group cities, and disseminated its work to a wide range of target groups.

The activities of PLUME relied heavily on the work undertaken by the DG RESEARCH LUTR cluster. The cluster comprised 12 projects covering a wide range of different topics within the LUTR subject area. The objectives of the LUTR projects were to develop strategic approaches and methodologies in urban planning that contribute to the promotion of sustainable urban development. This includes issues of transportation demand and related land use planning, the design and provision of efficient and innovative transportation services including alternatives to motorised transportation and the minimisation of negative environmental and socio-economic impacts. Short summaries of the objectives of these projects are included below:

ARTISTS: (Arterial Streets Towards Sustainability) To improve decision-making regarding the re-construction of arterial streets, taking into account a broad set of social, economic and environmental factors. This should enable European city authorities to re-design arterial streets in such a way to improve the physical environment of the corridors while contributing to the implementation of more sustainable transport systems.

ASI: (Assess Implementations in the frame of the Cities of) To improve assessment of Life Quality (LQ) and to make appropriate consideration of LQ assessment results in

Tomorrow Programme)	connection with urban transport and mobility policies. The focus of the project will be on the subjective part of LQ.
CITYFREIGHT: (Inter- and Intra- City Freight Distribution Networks)	To identify innovations in freight transport that could contribute to a more sustainable development in European cities; to set up assessment methods; to build sustainable freight transport options for 7 cities, assess these options with the proposed assessment tools; propose best practices and initiate implementation in the 7 cities.
ECOCITY: (Urban Development Towards Appropriate Structures for Sustainable Transport)	To develop settlement patterns giving priority to the requirements of sustainable transport. Necessary conditions are compactness and a balanced mix of land uses at suitable sites. The aim is to design model settlements in six participating countries and to derive general guidelines for planning.
ISHTAR: (Integrated Software for Health, Transport efficiency and Artistic Heritage)	To build an advanced software suite for the analysis of the effects of short-term actions and long term policies to improve the quality of the environment, citizens' health, conservation of monuments.
PROMPT: (New means to PROMote Pedestrian Traffic in cities)	To promote non-motorised transport in cities with particular focus on pedestrian traffic. The project seeks to identify, discover and disseminate innovative new tools and solutions for problem identification, problem solving and implementation of measures in order to promote walking in cities.
PROPOLIS: (Planning and Research for Land Use and Transport for Increasing Urban Sustainability)	To research, develop and test integrated land use and transport policies, tools and comprehensive assessment methodologies in order to define sustainable long term urban strategies and to demonstrate their effects in European cities.
PROSPECTS: (Procedures for Recommending Optimal Sustainable Planning of European City Transport Systems)	To provide cities with guidance to generate optimal land use and transport strategies to meet the challenge of sustainability in their particular circumstances.
SCATTER: (Sprawling Cities And Transport: from Evaluation to Recommendations)	To study the causes and consequences of urban sprawl in order to design and to assess the efficiency of measures aiming to prevent, mitigate or control this trend that threatens most of the European cities.
SUTRA: (Sustainable Urban Transportation)	To develop a consistent and comprehensive approach and planning methodology for the analysis of urban transportation problems, that helps to design strategies for sustainable cities.
TRANSPLUS: (Transport Planning, Land Use and Sustainability)	To identify best practice in the organisation of land use and transport measures in order to reduce car dependency in European cities and regions and promote economic, social and environmental improvement.
VELOINFO (the European network for cycling expertise)	To enable local authorities and experts in attaining sustainable urban planning by establishing a WWW-based expertise centre on bicycle planning policies and bicycle use, of which the usefulness and continuity is ensured.

European cities and transport planners represent supply/demand for expertise; VeloInfo is sustained by these users, ensuring optimal distribution of expertise.

This final technical report is organised as follows. Chapter 2 provides the main findings of the User Needs Assessment, Chapter 3 summarises the State of the Art Reviews, a summary of the PLUME Benchmarking exercise is included in Chapter 4, and chapter 5 provides a summary of the outcomes of the work of the Exploitation group. Chapter 6 highlights future research needs, and Chapter 7 deals with policy implications. Some final conclusions are drawn in Chapter 8.

2 USER NEEDS ASSESSMENT

A report on User Needs, Barriers and Gaps was produced at an early stage of the project. This was intended to help shape the synthesis of project results by identifying the areas in which End Users in cities required guidance. Subsequent End User consultation and interaction with the Projects Group took place on an ongoing basis and through the End User workshops. This continued interaction between the End Users and the Projects Group enabled most of the interests of the End User Group to be met.

2.1 Methodology

Information about End User needs was acquired through the first End User workshop, held in Brussels on 3 and 4 April 2003, and also through three questionnaires circulated by e-mail to the End User group cities. The first questionnaire was a pre-bid submission questionnaire. This was followed after the commencement of the project by a second questionnaire which provided input and a structure for the discussion in the First Workshop. Following the output of the First Workshop a third questionnaire was circulated to End Users.

The pre-bid submission questionnaire was circulated to potential End Users to determine their main problems and issues that they felt PLUME should address. It also asked about the experiences that the organisation could bring to the project and the likely benefits to them of being involved in PLUME. This pre-bid questionnaire acted as a filter for selecting the final group of participating cities.

The second questionnaire was circulated to End User cities prior to the first workshop. It asked for End User responses in the following two areas;

- State of the Art and Outstanding User Needs - The first set of questions obtained information on the state of the art on land use and mobility planning issues in the various cities and outstanding user needs. The core objective was to obtain a ranking of user needs and an understanding of how to present the research outputs to the cities.
- Benchmarking - The second section of the questionnaire was designed to inform the discussion on Benchmarking by finding out End Users experience of Benchmarking and identifying policies and solutions that might be benchmarked and the indicators that might be used to do this.

The first workshop was broken down into a number of groups which considered the areas covered by the second questionnaire. Following a very active plenary discussion session, it

was agreed that a further questionnaire should be circulated to End Users in order to gather more specific information. The objective of this third questionnaire was to determine specifically:

- Demographics of the city;
- City function;
- City description;
- Institutional structure;
- Strategic priorities;
- Key problems;
- Case studies;
- Policy instruments

2.2 Synthesis of End User needs

This section summarises the key End User requirements based on responses about the nature of research gained from the questionnaires and the first End User workshop.

2.2.1 Target Audience for LUTR Research

Whereas in the questionnaire technical staff were considered to be the primary users of research there was a clear indication from the workshop that research results should also be pitched at the decision-makers within the organisation i.e.: the politicians and other senior staff. Networking and events which enabled cities to share experiences were the most common ways of accessing ideas as these were thought to be an efficient way of finding out about procedures and hearing about results. Professional Journals were thought to be useful in the concise way that information was presented and it was felt that this approach would appeal to senior management and politicians.

2.2.2 Type of Research

Case studies, evaluation data, models and policy initiatives were all required by End Users. The most requested type of research required by End Users was primarily case studies. It is important that case studies which are narrow and do not offer 'lessons learnt' are avoided.

A popular suggestion for structuring case studies was to develop a "How to.." guide to enable cities to look for solutions. This would enable End Users to look at case studies and to focus on any areas where a certain part of the process has been conducted (e.g. consultation) and to determine the transferability of the procedure (or certain elements) to their situation. This would be a lot more useful than a case study which details the implementation of policies or measures providing an insufficient level of detail, thus preventing users from identifying which parts of the process may be transferable to their situation.

Some End Users saw new tools and models as important, for example, Gdansk needs tools and models to prepare plans. Microsimulation was also mentioned as a mechanism to make politicians more receptive to modelling because they are able to visualise the effects of proposals.

2.2.3 How problems can be tackled within PLUME

The workshop discussion indicated that problems are inter-related and it is not easy to prioritise individual aspects of a complex wider picture. All problems can ultimately be brought together as the problem of 'sustainable mobility'. There is a need to acknowledge trade-offs but ideally all problems on the list and their linkages should be covered.

Different sized cities may have different problems and this also applies to similar sized cities across different countries. For example middle sized urban areas often have a land scarcity problem but this does not apply in Norway. PLUME should therefore focus on the existing LUTR expertise and its application within different cities.

Based on the questionnaire responses congestion seemed to be the biggest problem being experienced by cities, followed by urban sprawl.

2.2.4 How solutions can best be used within PLUME

The quantitative analysis showed very mixed views on what the most important solution to address should be. Two key areas which most End Users saw as being important were management of road space and land use development, both of which were frequently ranked within the 3 most important solutions.

The workshop discussion indicated which solutions are used in cities and which are the most useful. The individual solutions presented in the questionnaire suggested that infrastructure provision should be broken down into new infrastructure issues and the reallocation of existing infrastructure as these will have very different effects. Road pricing and Public Private Partnerships were also mentioned as important solutions.

It was also suggested that putting walking and cycling at the centre of land use policy is more politically acceptable than car use reduction measures which appear to be penalising car users. There was some agreement that freight management solutions are lacking and a suggestion that those that do exist do not tend to be well understood.

2.2.5 Critical Process Steps

In the questionnaire, effective participation by stakeholders was ranked or marked as important by 5 cities and developing strategies was considered important by 4 cities. Solutions for financing strategies and overcoming political barriers are also important parts of the process which need addressing.

The workshop concluded that all steps are important and it is not appropriate to prioritise them. It was suggested that gaps in guidance existed on setting targets, impact assessment and the policy process. Involving the public is believed to be a difficult factor to address as consultation is often conducted at a stage where there is already some commitment to the project.

2.2.6 Benchmarking

The need to develop tools to benchmark the implementation of integrated land use and transport policies was identified as a requirement of PLUME and this was discussed in some depth with End Users and researchers at the End User workshops. The outcome of the PLUME Benchmarking exercise is outlined in more detail in section 4 of this report.

2.3 **Barriers**

The input of End Users in the workshop illustrated the barriers to finding and implementing solutions and achieving objectives. The key issues surrounded the institutional arrangements and political barriers which often make the integration of land use and transport difficult or even unfeasible. This was subsequently evident in the results of the second questionnaire with institutional barriers and political barriers being the main focus points. In addition there was evidence of physical barriers which are embedded in the characteristics of the geography and demography of the city; and financial barriers where financing the required public transport improvements are problematic.

2.3.1 Institutional Barriers

Barriers relating to the institutional structures were very common with evidence of the organisational structure making integrated land use planning difficult in Athens, Dresden, Rome, Vienna and Merseyside. Overlap of responsibilities amongst authorities and lack of concentration among several parts of public institutions provided the strongest barriers to the implementation of many policies.

Interacting with national authorities on infrastructure investment was also evident in Stockholm where problems arose with the negotiations needed for infrastructure affecting more than one municipality and subsequently the splitting of financing for investments between Stockholm and Central Government.

Barriers also exist in involving stakeholders and organisations outside the planning process. Vienna lacked co-operation models between politicians, administration, corporate activity and citizens. Rome also had problems managing participation as policies lacked a framework to enable the involvement of the private sector.

2.3.2 Political and cultural barriers

Public opinion and politicians' reaction to public opinion are common barriers to integrated land use and transport policy. Politicians are sensitive to the views of their electorate irrespective of how informed their opinions are on the effects of integrating land use and transport. There was evidence of political views being influenced by citizens, retailers and lobby groups in a number of cities. It was also clear from the cities that there is a political reluctance to implement any policy which may have or be perceived to have an adverse impact on economic growth.

Barriers can also be embedded in society. For example Rome has a number of different cultures and religions built into its 'urban fabric'. Inclusion of all of these groups is a key concern and the impacts of policy on these groups needs to be adequately assessed.

2.3.3 Financial Barriers

Financial barriers were evident in Naples, Rome and Dresden. Naples had problems with the costs of purchasing, maintaining and running clean vehicles and this remains a barrier to their implementation. In Rome there were problems with accurately estimating the costs of construction. Another barrier to the actual integration of land use and transport was the cost of property. Developments in urban areas and close to public transport hubs are priced at a premium to property in suburban areas.

2.3.4 Physical Barriers

Only some cities cited physical issues as their most significant barriers, as whilst physical barriers such as geographic structure and topography can present problems, they can be overcome with adequate technology and financing.

2.4 **Research Gaps**

The various exercises documented above were reviewed in order to identify user-perceived gaps in research. These gaps were allocated to one of two categories:

- Areas where research already exists that would "fill the gap". In this case, these research gaps were covered by the addition of further Synthesis Reports by the Projects Group.
- Areas where new research would be required to fill the gap. In this case the Projects Group identified the need for future research. These future research needs are detailed in Section 6 of this report.

The essential gaps which were identified by this user needs assessment and covered by subsequent synthesis reports were as follows:

1. Methods need to be improved to inform politicians about the results of research (i.e. "politician-friendly" means of dissemination are required)
2. Methods need to be devised to help technical staff get better access to research results
3. Research is required on how to finance projects
4. Research is required on public participation approaches
5. The essential lessons from case studies need to be extracted concisely from the large body of case study material in a way that will make these lessons more useful to other cities.
6. Research is required on methods for overcoming institutional barriers
7. Research is required on freight management solutions
8. Currently available solutions to freight management need to be disseminated in a way that would make them easier to understand
9. Better guidance for cities is required for setting targets, impact assessments and the policy process.

2.5 Conclusions

The PLUME partners sought guidance from the End User group of cities in a number of ways in order to seek to identify the areas in which research in the field of Land Use and Transport Integration could be undertaken or exploited more effectively. Numerous lessons which fed into the work of the Projects Group were identified both through the End User needs assessment and the subsequent End User workshops. This continued interaction between the End User and Projects Groups enabled most of the interests of the End User group to be met.

3 STATE OF THE ART

3.1 Introduction

This section summarises the state of the art in transport and land use planning as presented in deliverable 10 – the final PLUME State of the Art report. PLUME produced three annual State of the Art Reports, of which deliverable 10 was the final one. These reports were produced to achieve the central objective of PLUME, which was to facilitate the transfer of innovation in the field of planning and urban mobility from the research community to End Users. PLUME itself did not generate its own new results; it instead conveyed novel research findings previously dispersed around multiple land use and transport projects through a single outlet.

Each State of the Art report provided a synthesis of European research findings from the FP5 land use and transport research cluster¹ of projects supplemented by pertinent information from other national and international research. However, it is worth emphasising here, that the content of the State of the Art reports was primarily constrained to match the content of the land use and transport research cluster projects. In turn the content of these projects was dictated by briefs including specific research questions from the European Commission; thus, there may well be issues that readers feel are relevant that by definition, it has not been possible to include in the State of the Art reports. The State of the Art reports make recommendations as to which policies, measures, and tools are best able to meet the need for sustainable development, taking account of user needs and barriers to implementation. The work was undertaken by a group of experts involved in many of the projects considered.

Each State of the Art report was structured according to a number of “themes”:

A) Problems

1. Environmental Problems
2. Social Problems
3. Economic Problems

B) Policies

4. Land Use Planning Measures
5. Infrastructure Provision
6. Infrastructure Management
7. Public Transport

¹ The land use and transport research cluster and PLUME website is: <http://www.lutr.net>

8. Travel Demand Management
9. Information Measures
10. Pricing Measures
11. Walking and Cycling Measures
12. Urban Freight Transport Measures
13. Vehicle Technology Measures
14. Innovative Modes
15. Integrated Strategies

C) Processes

16. Setting Targets
17. Strategy Development
18. Strategy Impacts Forecasting
19. Strategy Appraisal
20. Public Participation
21. Strategy Implementation
22. Financing
23. Institutional Issues

The themes covered were identified through discussions at the first PLUME End User workshop held in Brussels in early 2003, and were checked again in the second workshop in March 2004. In addition to this, user requirements as identified in PLUME Deliverable 5 were also taken into account. The themes are structured hierarchically into three main groups - Problems, Policies, and Processes - which reflect typical decision-making processes in practice. Each theme is also addressed in more details in a separate document called a “synthesis report,” which presents all the relevant research from the land use and transport research cluster projects.

In order to spread resources efficiently over the lifetime of the project, some synthesis reports were prepared for the 2003 State of the Art report, some for the 2004 report, and some for the first time for the final report. All synthesis reports were peer-reviewed, including an international review, and the early reports have subsequently been updated. Summaries for all of the synthesis reports can be found in the final State of the Art Report.

The remainder of this section summarises deliverable 10, following the same logical structure as the State of the Art report. Problems and challenges are presented first, followed by policies, processes, and decision support tools. Finally, a vision for a future European city, based on the state of the art, is presented. The research implications drawn from the State of the Art Review are included in Chapter 3 of this report, and policy implications have been incorporated into Chapter 7.

3.2 Problems and Challenges

While vehicle technology improvements have led to a reduction in many local pollutants, cities still face serious environmental challenges. Local air pollution remains a problem, and its health impacts are now more widely understood. Noise has been overlooked as a problem in many European countries, but is likely to attract increasing emphasis as its implications for health and quality of life are more fully appreciated. Other local environmental impacts on visual amenity and historical monuments are less well understood, though research in ISHTAR has documented the scale of the risk to monuments. Transport in cities is also a

major contributor to global warming, and needs to be fully integrated into strategies for achieving targets for reducing greenhouse gases.

Congestion is a major challenge to economic sustainability, and is expected to continue to increase rapidly unless remedial action is taken. The costs of congestion, and the direct costs of provision and use of the transport system, are well understood. Considerable work has also been undertaken in connection with the external costs of travel on the environment, but the implementation of solutions to internalise such costs as a mechanism to manage travel demand has been limited. Behavioural solutions offer an alternative to fiscal policies but are equally complex to implement.

Social sustainability challenges include the impacts of accessibility, congestion, and the environment on quality of life; the social costs of accidents and lack of personal security; and the distribution of costs and benefits across society. Of these, the costs of accidents are best understood and quantified. Accident rates are falling in most cities, but further action is needed to reduce their impact further, particularly on the most vulnerable users of the road system. Most cities are giving greater emphasis to distributional issues and the reduction of social exclusion, but the scale of the problem remains less well understood and policy is largely driven at a political level rather than by transport issues. Quality of life remains a relatively ill-defined concept in urban planning.

3.3 Policies

In tackling the problems outlined above, cities have an increasingly wide range of policy instruments available to them. This range offers the potential for a much richer policy mix, but at the same time presents a challenge, in that cities need to understand better the contribution of each policy instrument. Several land use and transport research projects have contributed to this improved understanding.

A key message from several projects is that an integrated strategy will be more effective than one which focuses on a limited set of measures. Successful integrated strategies use combinations of policy instruments to achieve synergy and to reduce the barriers to their implementation. The three principal elements of a successful integrated strategy are enhancements to public transport, walking, cycling, pricing of car use, and land use policies designed to reinforce these two measures.

Public transport services can be improved most effectively by increasing service levels, improving reliability and operating speeds, reducing and simplifying fares, and enhancing the quality of the vehicles, supporting infrastructure, interchange options and information systems. Such moves must be underpinned by marketing initiatives to ensure that habitual car users are aware of improvements in service quality.

Controlling the growth of car use is essential if sustainability is to be increased. While some success can be gained through regulatory measures, and controls on vehicle speeds, pricing is likely to be the most effective means of control. Ideally this should be through a form of road pricing, though parking charges imposed on all forms of parking can provide an effective alternative. Such pricing policies remain politically unpopular, but public antipathy can be reduced by packaging of pricing with public transport improvements in an integrated strategy.

While land use measures on their own may have a limited impact on current travel patterns, they do enable public transport improvements to be more effective, and can avoid relocation in response to road pricing. The principal elements in an effective land use strategy are to focus development in centres and on public transport corridors, to maintain sufficiently high densities to support public transport, walking and cycling, and to reduce the provision of parking space. Where transport investment leads to an increase in land value, notably in urban metro investment corridors, land-value taxation may provide a mechanism by which transport costs can be recouped.

Road space needs to be managed more effectively, by allocating appropriate priority between general traffic, public transport, walking and cycling, frontage access, and public space. While most urban streets will be multi-functional, a balance should be determined for each street between its link status and its place status. A range of cost effective measures is available to enhance link and place status as appropriate.

Walking and cycling are important modes in most European cities, and can provide for a significant proportion of journeys. They offer an effective alternative for many car journeys, provide access to public transport, and may also help relieve congestion on more heavily used public transport corridors. They need to be fully integrated into the overall strategy by providing for them effectively in land use plans and in the reallocation of road space.

Attitudinal and behavioural measures, including individualised marketing and company travel plans, are attracting increasing interest. They can prompt individuals to consider alternatives to car use, promote specific public transport services, and stimulate walking and cycling. They have the added attraction of being a positive, rather than negative, means of controlling car use. However, the scale of their impact remains uncertain, and it is unlikely that they will ever remove the need for effective pricing of car use.

With this range of lower cost policy measures available, infrastructure investment (whether in roads or in public transport) will often prove to be a less cost-effective solution. Moreover, it can stimulate growth in journey lengths, which may jeopardise the pursuit of sustainability. Any such investment should be designed to be fully integrated into an overall strategy, so that it can focus on bottlenecks and gaps in the network, while avoiding the generation of additional travel.

New technology will have a continuing role in making vehicles safer and less polluting, and in reducing the emission of greenhouse gases. New modes such as personalised rapid transit and cybercars may offer effective alternatives to the car and conventional public transport in the longer term, but their potential remains to be demonstrated.

While most of the above conclusions relate principally to passenger travel, freight movements are a significant element in urban travel, and are predominantly road based. Freight is often overlooked in urban transport planning, but has important contributions to both environmental and economic sustainability. An integrated strategy of the kind outlined above can assist in more efficient freight movement. Within that context, 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.

3.4 Processes

The essential starting point for an effective land use and transport strategy is a clear set of policy objectives. Such objectives are specified through a series of processes, including, setting targets, strategy development, strategy impacts forecasting, strategy appraisal, public participation, and strategy implementation. Additionally, there are a range of processes, regulations, and issues associated with financing, and institutional issues that affect of the processes outlined here.

Policy objectives can be identified in the context of the three elements of sustainability: environmental, economic and social, but need also to address the impact of transport on other areas of public policy, such as health and social inclusion. Once the objectives have been identified, outcome indicators should be specified, which measure performance against these objectives. These in turn can be used to identify problems, to suggest solutions, and to monitor progress in overcoming those problems. Targets can be a valuable stimulus to strategy development and implementation, but need to relate to the agreed outcome indicators, and to be internally consistent. They may best be specified once the overall strategy has been agreed, and then used to monitor the achievement of the strategy.

Strategy development should be based on the agreed objectives and focus on the identified problems. Option generation remains an art rather than a science, and has become more challenging as the range of policy instruments has widened. Several land use and transport research projects have identified good practice in strategy development, including the importance of considering the full range of policy instruments, and formulating integrated strategies based on them. Such integrated strategies need to focus on achieving synergy, or at least complementarity, between the measures, and in helping to overcome the barriers of acceptability and finance. Optimisation techniques are now available to help in the design of such strategies.

A wide range of techniques is available for strategy forecasting. However, urban transport systems are complex, and for most applications predictive models are essential in understanding the impacts of proposed strategies. Several land use and transport research projects have demonstrated the application of such models, and provided advice on modelling practice. The main barriers to progress are the availability of skilled staff in cities; cities' own unfamiliarity with models, and the availability of good databases for model construction, calibration, and validation.

Strategy appraisal needs to be based on the agreed set of objectives. The principal methods are cost-benefit analysis and multi-criteria appraisal. The former relies on the ability to place monetary values on all objectives and impacts. As the range of objectives widens, this becomes more difficult. Multi-criteria appraisal is more flexible, in that it can use monetary values, quantified impacts or qualitative impacts as appropriate, and can reflect differing weights between objectives. Neither method is particularly well designed to reflect distributional impacts or to appraise aspects of social justice.

Public participation can contribute positively to all the above elements of strategy development, including agreement on objectives, problems, indicators and targets; input to option generation; checking forecasts; and appraising options. A range of methods is available; those which promote more active involvement are more expensive but more

effective. While such participation may add to the time taken for strategy development, it is likely to simplify the subsequent process of implementation.

Good practice in implementation is less well understood, and has attracted less research, than other elements of the strategy development process. However, research in TRANSPLUS has demonstrated that pursuit of integrated strategies, effective collaboration between disciplines, agencies and tiers of government, and active public participation all help to streamline implementation. A staged implementation process may also help, provided that a balance is maintained between pull and push measures, and between infrastructure management, pricing and public transport measures, and attitudinal and behavioural policies.

Urban transport systems are often subject to operational financial deficits and lack of capital to finance investment. Public budgets are the traditional sources of funding, but are under increasing pressure. For operational costs the other sources are user charges and cross-subsidy. Two broad approaches to obtaining capital for investment may be identified: outright privatisation, and public-private partnership.

For some time there has been a division of responsibilities between local, regional, national and multi-national authorities in relation to transport policy in urban areas, with different levels of authorities having different responsibilities in different countries. Industry reforms have sought to increase competition and promote greater involvement of the private sector in service delivery. Different areas of government have recognised the need to work more closely with one another, leading interest groups from related spheres of public policy to seek a greater input into transport policy. The assessment of good practice in these increasingly complex institutional arrangements is still in its early stages

3.5 Decision Support Tools

Decision making in land use and transport policies and actions is a very complicated process having a number of linked socio-economic, environmental (local and global), institutional and political issues. Very often the decisions are made without a clear perception of what the effects will be of the initiatives, measures and policies being undertaken.

Land use and transport policies and measures can have significant environmental and socio-economic effects, the estimation of which should be a key element of the appraisal process. We need, in practice, decision support tools allowing a technical comparison of alternatives and providing a quantification of impacts, necessary for ensuring sustainable land use and transport policies.

In general terms a decision support tool can be defined as any guideline, best practice identification, assessment method, planning methodology, or software tool providing decision makers with 'support' in making the best decisions. The PLUME projects have been concerned with developing decision support tools for sustainable land use and transport, whilst PLUME itself has drawn together the state of the art regarding the best land use and transport policies, and practices.

The final PLUME State of the Art Report considered the software planning tools that decision makers can use in designing and assessing land use and transport policies. Decision support tools in general and software planning tools in particular are one of the main outcomes of the PLUME projects.

The ISHTAR and PROSPECTS projects developed two particularly good decision support tools. Long term land use and transport policy can be analysed with the PROSPECTS sketching planning model, whilst the associated environmental impacts could be estimated with the ISHTAR software suite.

Different categories of decision support tool have been provided by the PLUME projects, including: guidelines, best practice, assessment methods, and software tools. The involvement of End User cities across Europe in the development of PLUME's various decision support tools has allowed wide and meaningful realisation, validation, comparison and application of the tools. The harmonisation of decision support tools to be used for land use and transport planning is an agreed target, and although reality shows that a variety of solutions can satisfy the same modelling requests, the PLUME projects have contributed to progress towards harmonisation. It is particularly important to note that such efforts towards harmonisation increase co-operation between conflicting municipal units and objectives.

3.6 Vision

We have illustrated many of these findings, and their possible impacts, through a sketch of a typical European city, Futuresville, as it might appear in 2030. The city's transport strategy has focused on improvements to the light rail network, gradual replacement of the bus service by automated personal transport, charging for car use based on distance travelled, and redevelopment of Brownfield sites and of the low density late 20th century developments. This core strategy has been reinforced by rejuvenated support for walking and cycling, and the development of freight distribution and transshipment centres on the old out-of-town superstore sites.

Car use continues to rise, but at a lower rate, and urban sprawl remains a problem, with people and freight making longer journeys. However, local pollution and noise are far less serious than they were, thanks to the improvement of public transport and the reuse of roads as public space. Congestion is also a much less severe problem, as a result of the change in the costs of car use and the improvements in public transport.

This successful strategy has been developed through a process of deciding together, in which residents, businesses and interest groups have all contributed to an understanding of the problems and possible solutions. They in turn have been aided by a clear and consistent approach to setting agreed targets and monitoring performance against them; Futuresville knows precisely how it performs by comparison with similar cities across Europe. The transport planners, who now work in close cooperation with land use planners and architects, have provided interactive forecasting tools, which enable everyone to see the likely impacts of new strategies before they are approved. This has helped considerably to increase acceptability of controls on car use, because they are seen as directly benefiting the city and helping meet its targets. All policies are appraised in a consistent way, with money values on all impacts reflecting public concerns, and helping to ensure that the city obtains value for money from all that it does.

The extent to which the Futuresville Vision occurs in practice will depend on the extent to which the lessons of PLUME and related projects are put into practice.

4 BENCHMARKING LUTR POLICIES

The LUTR benchmarking exercise was undertaken as part of the activities of the PLUME End User Group, and a report was submitted as an additional deliverable to the core actions. The primary aim of the exercise was to compare planning and urban mobility policies, measures and tools in the End User cities. The benchmarking exercise was a start which allowed the network to discuss how benchmarking of LUTR policies could be achieved and to carry out some preliminary investigations.

All End User cities were given the opportunity to participate in the benchmarking exercise and 15 of these cities provided data indicators relating to urban mobility and land use planning issues. Two sets of data indicators were collected; common indicators relating to transport systems, which were identical to those being collected for another group of cities in the DG TREN Urban Transport Benchmarking Initiative, and PLUME indicators relating specifically to urban mobility and land use planning issues.

4.1 LUTR Benchmarking Objectives

A total of five objectives were established at the outset of the PLUME benchmarking exercise and these have been evaluated below in order to measure the achievements of the activity:

4.1.1 Objectives 1-3:

- To enable cities in the PLUME End User Group to compare their own performance
- To set a baseline for longer term monitoring of LUTR integration in Europe
- To enable cities outside of the PLUME End User Group to learn from a comparison of their own city against an identified group of cities.

The performance comparison aspect of the PLUME benchmarking exercise was successful, since all of the cities involved have been included in like-for-like comparisons of both their urban transport and land use planning systems. The findings of the benchmarking exercise have been presented clearly and concisely and the graphs and tables prove straightforward comparisons across the fourteen cities and one county involved in the exercise.

The indicators developed through the PLUME benchmarking initiative have enabled the participating cities to develop an initial baseline of data which represents a starting point for the long term monitoring of LUTR integration. While it may be necessary to revise or redefine some of the PLUME indicators for future policy monitoring work (e.g. to improve the accuracy of information obtained) the baseline has been successfully set in place and requires adequate follow-up activities in order that the momentum developed through the initiative can be maintained.

A key aim of the PLUME Benchmarking report, the various exploitation materials produced as outputs of PLUME (e.g. the Decision Maker's Guidebook) and the dissemination events organised through the LUTR cluster have been aimed specifically at enabling cities to learn from each other. The report of the PLUME benchmarking activities has been designed to be as accessible as possible in order that cities not involved in the initiative can fully appreciate

the processes followed to undertake the exercise. The results have also been presented in as clear and concise a manner as possible in order that a city entirely unfamiliar with the PLUME initiative could draw comparisons between its performance data and that collected by the PLUME End User group.

It can be suggested that the tools are now in place for cities outside of the PLUME End User Group to benefit from the results of the benchmarking exercise. It is also likely that cities not involved in the initiative could be able to draw upon the lessons learned during the PLUME benchmarking process and apply them to internal performance benchmarking mechanisms within the field of LUTR.

4.1.2 Objectives 4 and 5:

- To seek objective evidence of what can be achieved through LUTR integration
- To establish the state of the art of LUTR integration in European cities so that researchers understand better the needs of cities.

The large amount of information collected by the PLUME indicators has enabled the development of a qualitative understanding of the extent of LUTR integration within the End User Group cities. The measures of “High”, “Moderate” and “Limited” LUTR integration have been established through this process and, when coupled to the quantitative information compiled through the common indicators, it has been possible to cautiously infer some degree of relationship between the deeper integration of LUTR strategies and the performance of cities. This has not been wholly objective, since the use of straightforward correlation techniques has not enabled the causal relationships between these indicators to be thoroughly explored.

Although not insurmountable, the obstacle of obtaining the wide range of data which is accurate and comparable enough to stand up to robust, inferential statistical modelling can be considered as a project in its own right. Within the scope of PLUME benchmarking this depth of analysis has not been possible.

Despite the inability to quantitatively identify “State of the Art” a broad range of good practices in LUTR integration has been compiled and contrasted in this report and these are of considerable value to the development of integrated land use and transport planning practices in Europe. Effective dissemination of these findings and the benchmarking processes that enabled them to be observed are therefore likely to assist researchers in the challenge of understanding the needs of cities. One simple example of this was the question which asked the End User Cities about their long term objective for urban form which provoked a range of responses from the participants including the following long term goals; ‘a strong city centre feeding robust District Centres’ (Merseyside), ‘strong urban centre’ (Koeln), ‘the development of the periphery into a system of neighbourhoods’ (Naples) and ‘two strong urban centres’ (Aalborg).

4.2 Urban Transport Performance

- The cities which submitted common indicator data represent a wide range in terms of population, surface area, population density and GDP per capita. Although this increased

the challenge of the data analysis process it enabled a broad overview of the range of transport policy implemented in different sized cities.

- The largest cities in terms of population displayed the widest range of urban transport modes. Dublin is an interesting exception to this rule, being the only city in the top six (in terms of population) not to have a metro system. The core mode of public transport in all fourteen of the PLUME End User cities that submitted common indicator data is the bus, and all but two of the cities have heavy rail/train networks.
- An inverse relationship exists between private car and public transport modal share in the participating PLUME End User cities. This trend is a logical finding which is supported by the research of the Urban Transport Benchmarking Initiative², although it is more prevalent among the PLUME End User cities. PLUME End User cities which displayed the highest levels of car ownership were also those with higher levels of car modal share.
- Scandinavian cities and The Hague demonstrated the most densely developed urban transport networks in relation to other cities in the initiative.
- The participating PLUME End User cities with larger cycle networks generally demonstrated the greatest modal shares for cycling and walking.

4.3 Integrated Land Use and Transport Strategies

- Vienna, Dublin, Helsinki, The Hague and Stockholm demonstrated the highest degree of integration between land use and transport planning strategies. These cities also displayed relatively high levels of population density (Athens was again the exception to this trend, displaying relatively limited levels of integration between transport and land use planning strategies and high population density figures, are all located in Northern member states of the EU and demonstrate relatively high levels of GDP per capita, in excess of the EU25 average.
- Cities with “High” levels of transport and land use planning integration were generally those with the highest proportions of the urban population that lived within walking distance of public transport services and links to healthcare, education and employment. Athens is a slight exception because it demonstrates a high level of public transport coverage and network density, but has a relatively limited degree of land use and transport planning integration.
- Surrey, Clermont Ferrand, Cologne, Dresden, Aalborg and Merseyside demonstrated a moderate degree of integration between land use and transport planning strategies.
- Athens, Naples, Gdansk and Suceava demonstrated a limited degree of integration between land use and transport planning strategies. These cities all display levels of GDP per capita which fall below the EU25 average of €1,172.

² Urban Transport Benchmarking Initiative final reports, available at: <http://www.transportbenchmarks.org/publications/reports.html> , accessed on 16/02/05.

- In general the larger participating PLUME End User cities tended to state that polycentric development was the long term goal for the urban form of the city, while the smaller cities were aiming for a strong urban centre.
- The majority of the participating PLUME End User cities have strategies to promote walking and cycling, which represents the most widely used policy in relation to both land use and transport planning. A range of approaches have been adopted by these cities.
- Policies to restrict the supply and to increase the price of car parking are in place in the cities of Helsinki, The Hague, Aalborg, Clermont Ferrand and Vienna. Policies adopted by the PLUME End User cities include the removal of free on-street parking spaces, zonal parking systems according to the proximity to the city centre, greater use of park and ride schemes and use of the planning system to limit the parking spaces available for new development. Road User Charging schemes remain relatively unpopular, with only two of the fifteen cities planning to implement such schemes.

4.4 Trends established through cross analysis of urban transport and land use strategy implementation indicators

The cross-analysis of PLUME and Common Indicators collected for the PLUME benchmarking exercise revealed the following trends:

- The PLUME cities with the most stringent land use planning requirements and development controls in terms of access to public transport and restrictions on parking are those cities which have the highest levels of GDP per capita. The cities with lower levels of GDP per capita, particularly below €10,000, were less likely to have development and land use controls and more likely to offer financial incentives to encourage private enterprises to locate close to existing or planned public transport links.
- Incentives for brownfield investment are sparsely used by the participating PLUME End User cities and no cities have a blanket policy to encourage private enterprises to locate on brownfield sites. The main application of brownfield incentives has been through major urban redevelopment schemes such as those applied in Merseyside and Dublin.
- Roads dominate the urban transport networks in all of the cities participating in PLUME benchmarking. There is little or no relationship between the proportion of the urban transport network that relates to public transport and road networks and the respective modal share figures or the degree of integration between transport and land use planning strategies for the PLUME End User cities.
- There appears to be a modest positive relationship between the length of cycle lanes and the modal share of cycling in the participating cities. Although there is not a sufficient critical mass of cities involved in the PLUME benchmarking exercise to fully uphold this trend, the results for 29 cities from the Urban Transport Benchmarking Initiative³ also reflected this pattern.

³ Urban Transport Benchmarking Initiative Final Report, available at: <http://www.transportbenchmarks.org/publications/reports.html>, accessed on 21/02/05

The range of information collected and the trends identified among the 14 cities are encouraging and have potential to be exploited further. The key recommendations for exploiting and developing the outcomes from the PLUME benchmarking exercise are summarised below:

- The findings of the PLUME benchmarking exercise should be disseminated as widely as possible through the use of relevant city networks and publications in the European urban policy making arena. The PLUME benchmarking exercise was reported at the final event of the PLUME initiative and will also be disseminated to existing and planned benchmarking projects in the field of urban transport and land use.
- The PROSPECTS Decision Makers Guidebook has been updated as an implementation guide for integrated urban land use and mobility policies. This guide will enable cities from outside of the PLUME End User Group to learn about the benefits of land use and mobility policy integration in urban areas. It will also help to publicise the findings of the PLUME thematic network.
- Consideration should be given to continuing the PLUME benchmarking exercise with a commitment to a longer period of operation (e.g.3-5 years) and the involvement of a greater number of cities (a minimum of 25) in order to benefit from the baseline of data collected for the study year of 2002 as part of this exercise and the suite of data indicators developed. This would enable a more formal benchmarking activity to be undertaken, with greater scope for statistical enquiry into the performance of the cities' urban land use and mobility policies and the monitoring of time-series data.
- A long term urban land use and mobility benchmarking initiative might also consider the benefits of linking the goals of land use and mobility policies with other sustainable development fields.

5 EXPLOITATION OF LUTR

Outcomes The PLUME Exploitation Group produced three Exploitation Plans designed firstly to design the overall LUTR exploitation strategy and secondly to identify specific exploitation actions to be undertaken for promoting the good practice identified in the published PLUME State of the Art reviews. This section is a summary of the final exploitation plan.

The general objective of PLUME was to facilitate the transfer of innovation in the field of planning and urban mobility from the research community to End Users. The specific objectives of the exploitation activities were:

1. To develop and implement a coherent Land Use and Transport Research (LUTR) dissemination strategy in the European Union, as a part of the EU Sustainable Development Strategy;
2. To disseminate effectively the results and solutions of EU Land Use and Transport Research, as identified in the PLUME State of the Art reviews in a form suitable for specific user needs, to a wide range of target groups throughout Europe.

Accordingly, the exploitation activities were undertaken in two different streams:

- **Strategic overview of National Sustainable Development Strategies**, to check how they fit with LUTR purposes and in particular to what extent they might respond to the headline objectives of the EU Sustainable Development strategy that are more strictly related with achieving sustainable transport and land use (this is detailed in Section 5.1);
- **Tactical actions at country level** which were undertaken in the national and regional contexts to promote dissemination of good practice. These actions were aimed in particular to convey the solutions offered by the LUTR projects towards interested End Users at national, regional or local level, based on the knowledge of their problems and needs (this is detailed in Section 5.2).

5.1 Strategic overview of National Sustainable Development Strategies

For the strategic overview, the members of the PLUME Exploitation Group analysed existing national and regional Sustainable Development plans, identifying to what extent and how these plans address issues of relevance for LUTR (e.g. urban sprawl, transport congestion, etc.). This analysis was undertaken for the following countries:

- Austria
- France
- Germany
- Greece
- Ireland
- Italy
- Netherlands
- Norway
- Portugal
- Spain
- Sweden
- United Kingdom

The review of sustainable development plans shows a landscape of national initiatives whose implementation in the various countries is very uneven, ranging from simple declarations of intent to more advanced implementations and experiences. However, the good news is that a cornerstone national document setting up a national Sustainable Development strategy has been found in each of the 12 EU countries surveyed. Usually this is a recent document, covering several issues in the economic, environmental and social dimension, but with a greater emphasis on the environmental objectives.

It is difficult to find in these cornerstone national documents, a direct correspondence with the headline objectives of the EU Sustainable Development Strategy and in particular with those objectives aiming to improve the transport system and land use management. However it is clear that a more holistic approach to sustainable transport including land use and transport issues has been developed in many countries.

Starting from these national strategies and from the actors responsible for their implementation, it is possible to identify strategic LUTR exploitation channels and targets. These include mainly national or regional authorities, agencies, associations of local

authorities and university departments that (depending on specific circumstances) may act either as channels to disseminate and exploit LUTR research results or as ultimate targets.

The cornerstone national documents reflecting the three EC headline Sustainable Development objectives and details of how these are being implemented are outlined in Table 5.1. Table 5.2 outlines the strategic LUTR exploitation channels and targets which might use PLUME outputs, and which were therefore targeted with PLUME exploitation activities.

Table 5.1 Cornerstone National documents and implementation of these strategies in project countries

Country	Cornerstone National document	Strategy implementation and obstacles
Austria	Spatial Development Concept (2001) - Focus on sustainable use of resources and enhanced accessibility.	There is no general guidance on how Sustainable Development should be treated in Austria. The State does not have full competence on spatial planning, which results in a different approach and level of implementation of sustainable development in each of the 9 federal states. To date, the clearest document addressing Sustainable Development is the Spatial Development Concept of 2001. Furthermore, the Spatial Development Concept is not legally binding for the federal states and the local communities, it merely represents a recommendation.
France	Law on strengthening environmental protection (<i>Loi relative au renforcement de la protection de l'environnement</i>): 1995. Law on Air and Rational Energy Use (<i>Loi sur l'air et l'utilisation rationnelle de l'énergie</i>): 1996. Framework Law on sustainable territorial development (<i>Loi d'orientation sur l'aménagement et le développement durable du territoire</i>): 1999 Law on Solidarity and Urban Renewal (<i>Loi relative à la solidarité et au renouvellement urbains</i>): 2000 National Strategy for Sustainable Development (<i>Stratégie nationale du développement durable</i>): 2003	In France, the notion of sustainable development became a clearly defined component of public policies from 1995 onwards.
Germany	National Strategy for Sustainable Development (2002) - Focus on efficient energy use and climate protection, sustainable mobility, sustainable production and consumption patterns, demographic change, education, sustainable economic growth, sustainable land use and housing development, abatement of poverty and fortification of fair trade.	Many of these policies have been implemented in local and regional authorities, initiatives, programmes, guidelines and laws in the last ten years. However in many cases there are barriers which prevent optimal implementation including; increasing urban sprawl (the current spatial planning instruments are not sufficient to prevent further dispersion of land use), there is a lack of implementation of restrictive measures against traffic, there is a lack of regional co-operation and the system of fiscal instruments in the transport and land use sector at federal level has an unfavourable effect on policies of sustainability, by providing tax incentives for car use and property and does not orient subsidies on criteria of sustainability.
Greece	Law 2508/97, Sustainable Development of Cities and Settlements of the Country (1997), Law 2742/99, For the regional planning and sustainable development (1999), and 3rd Development Plan (1999) - Focus on reduction of regional	Integrated land use and transport in urban areas is currently not actively pursued in Greece. Some correlations of transport and land use data have been attempted in several studies; however the philosophy of the LUTR research is not yet investigated. One of the primary reasons is the lack of information on the results

Country	Cornerstone National document	Strategy implementation and obstacles
	disparities, protection of natural resources and environment, promotion of metropolises and promotion of IT.	of current research in this scientific field. Such deficiency is even more accentuated in Greek cities. Another major problem is the staggering number of actors involved in the planning procedure, both horizontally and vertically, which breaks down competences.
Ireland	<p><i>National Development Plan (1999)</i> - Focus on economic growth and promotion of a balanced regional development.</p> <p><i>National Spatial Strategy (2002)</i> - Focus on dynamic rural economies, public and private transport infrastructure, at strategic points to drive SD and the role of the environment in economic development.</p>	An example of the integration of land use and transport in Ireland is the creation, in 1995 of the Dublin Transportation Office (DTO), an independent state agency with responsibility for transport planning and strategic land use (albeit with no statutory power to enforce it) for the greater Dublin area. In addition, the Irish Government is committed to establishing a Public Transport and Land Use Regulator, to have control over the provision of public transport under a system of controlled competition. The rest of the country must also abide by the strategic planning guidelines, and the 2000 Planning and Development Act, which formulated the following provisions: i) planning authorities must produce a Development Plan every six years, ii) these plans must take into account of land use and transport, energy and communication facilities, and iii) these plans must be consistent with national plans relating to Sustainable Development.
Italy	<i>Environmental Strategy for Sustainable Development (2002)</i> - Focus on climate change, protection and sustainable use of nature and biodiversity, quality of the environment and life in cities and the countryside.	Despite the considerable efforts and promising new planning provisions included in recent laws, sustainable development policy has not been absorbed into institutional arrangements and decision-making at all levels (central, regional and local). The consideration for sustainable development issues, despite its growth in the 1990s, has yet to become government or administrative culture. Common barriers are legislative delays, limited use of land use powers, lack of institutional integration, scarce participation of the stakeholders and lack of coordination between land use and transport authorities.
The Netherlands	<p><i>Action Program for Sustainable Development (1989)</i> - Focus on Sustainable Development at large, addressing the decisions of the UN and the impacts on the Dutch policy.</p> <p><i>Fifth National Policy document on Spatial Planning (2001)</i> - Focus on the development of areas with a high ecological (sustainable) quality.</p> <p><i>National Traffic and Transport Plan (2001)</i> - Focus on reduction of road traffic emissions to increase local liveability.</p>	The concept of Sustainable Development has been addressed in the Netherlands since the late 1980s, though strategic plans for transport and spatial planning. The main LUTR related policies implemented in the 1990s are: i) a location policy for businesses and services (the now well-known ABC location policy), ii) a location policy for peripheral and large scale retail/trade establishments (PDV/GDV policy), iii) and a location policy on new large scale dwelling locations for housing. The upcoming agenda of the Dutch Government seems oriented to finding a new dimension for integrated land use and transport planning, which is seen as having impacts especially on the local environment and local quality of

Country	Cornerstone National document	Strategy implementation and obstacles
		life. Thus, a shift from the traditional national scale to a more decentralised level is envisaged, with LUTR planning and implementation decentralised to regions and municipalities. This transition is expected to increase efficiency, as local problems will find local solutions in accordance with the subsidiarity principle.
Norway	<i>National Strategy for Sustainable Development (2002)</i> - Focus on international cooperation; healthy and stable economic development; health, urbanisation, education and culture; environmental protection; and management of natural resources <i>National Transport Plan</i> (every fourth year). <i>Planning and Building Act</i> (1985)	Obstacles to the implementation of the good intentions of these policy documents include; the objectives in policy documents are difficult to interpret in practical terms and the fact that organisational structure does not always provide the right incentives for actors in urban development, the result being sub-optimisation. Furthermore, the high cost of building in central urban zones limits the Government's policy to concentrate urban development and sometimes the results of impact assessments do not necessarily play a significant role in decision-making processes and other considerations may be important in the political "game". For example, politicians might prefer plans that provide for short-term and visible results.
Portugal	<i>National Strategy for Sustainable Development (2002/3)</i> - Focus on promotion of territorial integrated development, environmental quality, sustainable pattern of production and consumption, and fair knowledge-based society.	The first hint of Sustainable Development in a Portuguese policy document dates back to 1987, with the publication of the Framework Law on Environment. However, the integration between land use and transport is to date one of the most important weaknesses hampering the Portuguese planning process. This disconnect is visible both horizontally and vertically, mostly because of the centralistic tradition and the scarce communication or overlapping competences. Furthermore, the desired involvement of relevant stakeholders and society at large is still deferred by the lack of tradition in participatory approaches. This is mostly due to the lack of clear understanding that politicians and decision makers have of the benefits of public involvement, and to the stakeholders' somewhat limited preparation and/or interest in participating to the planning process.
Spain	<i>Sustainable Development National Strategy (2000)</i> - Focus on decoupling economic growth from environmental degradation, qualitative elements of development, and integration and coordination of the sectoral policies that contribute to the quality of life.	A number of other strategic documents have been approved since the Sustainable Development National Strategy, Spain however does not have any specific legislation linking transport planning and urban development.
Sweden	<i>Government strategy</i> (late 1990s) - Focus on the future of the environment, limitation of climate change, public health, social cohesion and security, employment, sustainable economic	Integration of land use and transport planning has a long standing tradition in Sweden and sustainable development dates back to 1992, when following the UN Conference of Rio de Janeiro, all Swedish local authorities and most public

Country	Cornerstone National document	Strategy implementation and obstacles
	growth, regional development and sustainable community development.	authorities were shortly after involved in this effort in one way or the other, and more than 70 % of the municipal councils have since adopted local Agenda 21 plans. Swedish authorities adopt an objective oriented management, with progress being monitored against the objectives and measures of the strategy, using sustainability indicators and reviews.
United Kingdom	<i>A Better Quality of Life: A Strategy for Sustainable Development in the United Kingdom (1999)</i> - Focus on maintenance of high and stable levels of economic growth & employment, effective protection of the environment, prudent use of natural resources and social progress that meets the needs of everyone.	The concept of Sustainable Development has been at the centre of UK's public policy throughout the 1990s; however evidence from local authorities working in the UK has indicated that there are many barriers to the implementation of sustainable land use and transport. These barriers can be organisational, political, legislative, financial, cultural and technical.

Table 5.2 Main exploitation channels and targets in project countries

Country	Main Exploitation Channel for use of PLUME outputs	Main Exploitation Target
<i>Austria</i>	<i>The agency of the Austrian Land Use Planning Conference (ÖROK).</i>	<i>The Federal States.</i>
France	<u>National level</u> Ministry of Ecology and Sustainable Development Ministry of Transportation and Urban Planning National Agency: Agency for environment and energy Management (ADEME) <u>Regional level</u> Regional Agencies for Environment Regional delegations from ADEME	<i>Local authorities (decision-makers and technicians), Citizen Associations, Universities and research centres, Professionals from private companies</i>
Germany	<i>National contact point in ILS NRW, ministries at the national and Lander level in the fields of transport, housing and environment; national agencies and associations at the local level.</i>	<i>Authorities at the state, Lander and local level.</i>
Greece	<i>Ministries at the national level in the fields of environment, infrastructure and transport, local authorities, and national technical chambers.</i>	<i>Policy makers at national and local level, technical executives and research institutes.</i>
Ireland	<i>Local network of Universities and LUTR national contact point in TCD.</i>	<i>Academic and research community and policy makers at national and regional levels.</i>
Italy	<i>Ministries at the national level in the fields of environment, infrastructure and transport, economy and finance. National agencies (ENEA, CNEL) and associations at local level (UPI, ANCI).</i>	<i>National and local authorities.</i>
The Netherlands	<i>TNO, kennisplatform Verdi, Vereniging van Nederlandse Gemeenten, Interprovinciaal Overleg.</i>	<i>Authorities at the national, regional and local level.</i>
Norway	<i>Ministries, national networks for urban planning and transport, and TOI</i>	<i>Planners and decision makers at the national, regional and local level</i>
Portugal	<i>Ministries, regional commissions and national associations.</i>	<i>Policy makers, planners, researchers, consultants, non-governmental organisations.</i>
Spain	<i>Associations at the local level (FEMP, SFMP) and regional level (Autonomous Governments).</i>	<i>Regions, provinces and municipalities.</i>
Sweden	<i>Local authorities and regions, ministries and national agencies and boards, national organisations.</i>	<i>Politicians, policy makers, executive/managers, experts and planners at community, regional and national levels</i>
United Kingdom	<i>The Government Offices for the Regions and the Regional Co-ordination Unit at the regional level, and relevant Government Departments at the national level. Other channels include the Passenger Transport Executives and the university departments in the field of land use and transport planning.</i>	<i>Authorities at the national, regional and local level.</i>

5.2 Tactical actions at country level

Regarding the tactical actions, the members of the PLUME Exploitation Group identified a range of actions that might be taken in their own countries.

5.2.1 Production of dissemination material and other activities

The following dissemination material was produced for PLUME;

- PLUME brochures were produced in various national languages.
- 3 issues of the PLUME newsletter were produced, of which the final one (June 2005) includes summaries of the PLUME national seminars and summarises the main conclusions of the State of the Art Reviews.
- The LUTR web site (www.lutr.net) was taken over by PLUME and was further developed and maintained throughout the project.
- National LUTR Guidelines were published in the form of a book in national languages, to be widely disseminated in the countries concerned.

Other dissemination activities took place such as:

- compilation and maintenance of contact lists,
- information campaigns to Ministries and Planning Departments,
- Interviews with relevant stakeholders

5.2.2 Exploitation of national and regional networks of public authorities and stakeholders

National and regional networks of public authorities and stakeholders were used to promote LUTR results (including the establishment of links with current community networks active in the field). These exploitation activities are detailed in Table 5.3 below.

Table 5.3 Summary of exploitation activities

Czech Republic	<ul style="list-style-type: none"> ▪ Participation in the City of Tomorrow and Cultural Heritage Conference, held in Prague on 1-2 July 2004, with a PLUME poster session
Denmark	<ul style="list-style-type: none"> ▪ participation in the Aalborg+10 Conference, with a PLUME poster session (9/6/04 – 11/6/04)
Germany:	<ul style="list-style-type: none"> ▪ Production of PLUME leaflet in German language which was then distributed at related thematic workshops and conferences ▪ Circulation of leaflet to 700 highly engaged decision makers and planners, cooperating researchers and transport associations. ▪ Publishing information on PLUME activities and available reports by ILS electronic newsletter for transport issues ▪ Publishing articles on PLUME results in planning magazines ▪ Translation of summaries of Synthesis Reports into German ▪ Presentations made at PLUME members at the AMUS-conference for integrated urban and transport development 2004 in Aachen.
Ireland:	<ul style="list-style-type: none"> ▪ A link was made from the Centre for Transport Research website to the LUTR website ▪ a short national document detailing the LUTR research was produced and sent to all relevant parties in Ireland; ▪ An address list was established for distribution of PLUME research ▪ PLUME research was presented at national level conference, via poster sessions and presentations
Italy:	<ul style="list-style-type: none"> ▪ Presentation of the PLUME activities at the CEMR seminar held in Bologna, on 20 October 2004 ▪ A contact list was established made up of highly visible and strongly dedicated individuals holding positions in institutions at the national and local level.
Norway:	<ul style="list-style-type: none"> ▪ A letter was sent on PLUME goals and activities to 25 contacts in several Norwegian organisations, including the National Rail Administration, the National Road Administration, the Oslo PT company, the Norwegian Hauliers Association, the Association of local and regional authorities, the National association for cyclists, and other public bodies and NGOs. ▪ Contacts were developed with the Ministry of the Environment
Portugal:	<ul style="list-style-type: none"> ▪ A Contact Database was established ▪ PLUME general dissemination to municipalities and relevant institutions (about 70 addressees) ▪ Production of targeted / adapted material ▪ Presentation of LUTR (TRANSPLUS) in the national geography congress ▪ Project with Lisbon Municipality on urban freight ▪ Visits to new urban communities and Metropolitan areas
Spain:	<ul style="list-style-type: none"> ▪ Contacts were maintained with the SFMP, the Spanish section of the Municipalities and Regions European Board. ▪ Regional contacts such as the main Autonomous Governments, such as Madrid, Cataluna and Valencia were also targeted.

The Netherlands	<ul style="list-style-type: none"> ▪ Interviews were organised with key players at the Dutch Ministry of Transport, Ministry of Spatial Planning, the KPVV (the institute responsible for disseminating knowledge at the national level towards regions and cities) and municipalities ▪ TNO presented a paper at the European Transport Conference in 2003; 'Learning from European experiences in the field of land use and transport planning: a Dutch case study'. ▪ A report was produced by TNO for Dutch land use and transport planners which focused on applying the results of the TRANSPLUS project to the Dutch situation in land use and transport planning.
United Kingdom:	<ul style="list-style-type: none"> ▪ Letters to all local authorities promoting PLUME were circulated along with a copy of the PLUME newsletter. Those interested in PLUME provided their details, allowing for the development of a 50-60 people contact list interested in attending PLUME events. These contacts were also sent the PLUME leaflet and were invited to the PLUME regional seminars. ▪ Meetings were held with representatives from the Department for Transport and Office of the Deputy Prime Minister (responsible for planning) to discuss PLUME. ▪ Information about PLUME provided in TRL Network exchange monthly newsletter.

5.2.3 Organisation of PLUME national seminars

A series of PLUME national seminars were held throughout the course of the project and are summarised below. The national seminar planned to take place in Cologne; Germany in June 2005 was merged with the final PLUME conference which was held on 15 June 05 in Cologne.

Table 5.4 Summary of PLUME national seminars

<p>Dublin, Ireland 'Integrated mobility policies for sustainable urban development: the contribution of European Research' - 4/2/04</p> <p>Tony May (ITS Leeds) presented at Centre for Transport Research, Trinity College Dublin event entitled 'Integrated Mobility Policies for sustainable urban development: the contribution of European Research'. The seminar was attended by about 20-30 experts with responsibilities in the processes of mobility and land use planning at the urban and regional level.</p> <p>The Irish seminar was a good opportunity for experts in the area of transport and land use planning to discuss the various issues, exchange experiences and make new contacts. It was useful to present case studies from the three main metropolitan areas in Ireland (Belfast, Cork and Dublin), in that it provided a forum for shared experiences and providing an overview of the current situation in Ireland. It also enabled discussion on common barriers to achieving a sustainable urban environment. The seminar timetable was adapted to enable all of the Irish presenters to speak before hearing the experiences from the Plume research. The city representatives requested this in that they felt it would inform the proceeding discussion. Moving on from the seminar a core network for dissemination has been established. Using the LUTR website the presentations and documentation from the Irish seminar has been distributed. Members of this core group do not only include the attendees</p>
--

of the seminar, but those who have expressed an interest in the PLUME project. It is via this network that it is intended that all future dissemination will take place. During the remaining lifetime of the project, dissemination was conducted via email.

Stockholm, Sweden ‘Forum for sustainable traffic planning and urban development’ - 7/6/04 to 8/6/04 and repeated in April 05

The Swedish Association of Local Authorities (SALA) and the City of Stockholm arranged a seminar which was attended by about 60 representatives of Swedish municipalities and regions but also from state ministries, administrations and institutes. The objective of the seminar was to show good international and Swedish examples of how decision-making and integrated town planning and transport planning supports sustainable development in cities and regions for example how alternatives to the private car have been supported from local governments.

The discussions at the seminars reached the conclusion that the most important factors behind success in the examples discussed were political leadership, competence and cooperation between different professional groups.

Zaragoza, Spain – seminar on Planning and Urban Mobility in Europe - 24/6/04

The seminar in Spain was attended by people from different levels, such as public institutions (Ministry for Development, regional and local governments, consultancy, and construction companies). The majority of attendees were from Spain, although some came from South America. The seminar was chaired by the Centre for Transport Research of the Madrid Polytechnic (TranSyT - UPM) and ended with a lively debate which made the following conclusions and recommendations:

- To set up, on obligatory basis, “mobility audits” in all urban plans. This could be done at local level or for developers
- All urban developers should prove their coherence with the city mobility plan (supposing the city has one) or, if not, develop their own.
- Creation and maintenance of national (or local) websites with data on air quality, mobility, and, in short, all those data not found in Eurostat.

Rome, Italy ‘Sustainable Mobility and Urban Development: the European Research Contribution’ - 18/2/05

The key challenges facing today the urban environment were discussed at this event, and integrating land use and transport policies were presented as a way to answer to these challenges in the medium to long term. Case studies presented at the seminar included the London congestion charge, Stockholm land use and transport policies and Italian case studies of Naples and Genoa. The key messages which came from the case studies presented at the event included;

- To deal with complex urban systems adopting single measures may be useful, but rarely sufficient. There is not a single solution to urban mobility and sustainable development which can be applied everywhere or let alone in specific local contexts to solve a major problem. For instance, improving public transport alone is not a solution to urban congestion: we need also to limit the access to private vehicles in the most congested

- zones, to improve accessibility to public transport, planning denser and mixed land uses.
- So far combining policies to achieve synergies has to be accepted more or less as a matter of principle. However, we need a wider knowledge and better proof of the effects of packages of transport measures – including carrots and sticks – and land use planning measures, in the short, medium- and long-term.
 - Finally, there is the need to create the awareness of sustainability challenges and possible solutions throughout the complex web of institutions – local, regional, national - that usually are involved in ensuring the coordinated planning and implementation of policies, and the overall success of the entire package. This awareness is the basic prerequisite to overcome the barriers to the integration of policies.

Crowthorne UK ‘Planning and Urban Mobility in Europe’ - 10/3/05

A workshop was held at the TRL offices in Crowthorne, Berkshire. There was a large amount of interest in workshop and 11 representatives from local authorities attended the event. The workshop was split into 3 discussions areas with guest speakers discussing the following topics; ‘Today’s Challenges’, ‘Today’s Solutions’ and ‘Today’s Vision’.

The aim of the workshop was to allow representatives from UK local authorities to consider some of the policies and ideas considered and implemented in cities in Europe in order to help with the delivery of current polices and plans. The workshop also allowed local authority representatives to network and discuss how to overcome issues faced in this area of policy. The main conclusions of the discussions are outlined below;

- Many attendees wanted to be kept informed and updated on PLUME and future European projects.
- Feedback from attendees indicated that the workshop provided a good opportunity for networking.
- Due to local government requirements and heavy workloads PLUME and other EC projects are often not high on their agenda.

Paris, France ‘Land Use and transport integrated strategies in Europe’ 17/3/05 - Seminar organised by CERTU (over 150 attendees).

This event was attended by specialists in urban activities, technicians from local communities and state services, elected representatives and academics. The presentations included an introductory presentation about PLUME, and case study presentations from Italy, France, Belgium, UK and Holland.

The following main questions were raised during the debate that took place throughout the day. Whilst these exchanges were not able to provide replies to all of these questions, they did succeed in opening up several paths of reflection, which will need to be looked at in closer detail:

- **Transferability:** to what extent can urban planning and transport integrated policies conducted in foreign countries be transferred to France? Or do they depend, on the contrary, on specific conditions (institutional, geographical, cultural, etc.) related to a given country?
- **Density:** from compact cities to polycentric cities, which urban form corresponds to a

dense city model that favours sustainable mobility?

- **Assessment:** due to the complexity of relations between urban planning, transport and life styles, are we really capable of isolating and appraising the impacts made by urban policies on mobility practices in a relevant way?
- **Real estate and accommodation:** how to reconcile the need to keep control over urban sprawling, which induces high level of car use, with the presence of an extremely taut real-estate and property market and populations who, for the most part, would like to live in detached homes in peripheral areas?

6 FUTURE RESEARCH NEEDS

6.1 The identification process

The identification of research gaps and future research needs has been an ongoing part of the PLUME project. Research gaps identified early in the project were addressed by including additional synthesis reports. When these were revised, they were updated to reflect the findings of the land use and transport research projects, and of related research programmes. The remaining research gaps are summarised in this Section. They provide an outline specification for a future research programme.

6.2 Future research needs

While the land use and transport research programme has substantially increased our understanding of the requirements for sustainable urban land use and transport strategies, several research needs remain. These have been categorised into seven domains. The first three: human behaviour, technical performance and new trends, all help to increase our understanding of the fourth: land use – transport relationships. The last three deal with ways of conducting, disseminating, and applying that research: research methods, political aspirations and professional applications. All of these seven domains are interdependent, and each draws on a distinct set of disciplinary approaches. Any future research programme needs to integrate the contributions of these different disciplines into a truly interdisciplinary approach if it is to be successful.

Better communication of key findings from researchers to professionals, politicians and the public will be essential if the lessons for sustainable mobility are to be learnt. Equally importantly, cities need to learn from one another both by example and by testing the transferability of successful initiatives. The sustainability paradigm may serve not just as a basis for evaluating the success of different policy options, but as a means of airing societal aspirations for the future of cities. To this end, the public needs to be more fully engaged, by adopting a clearer and more tangible expression of the concept of sustainability.

As mentioned previously, the research needs are structured into seven research domains. The first four research domains broadly relate to the questions concerning knowledge to answer questions such as:

- What is the nature of things?
- How are things related?
- What happens in the world?
- What generally is the impact of x on y ?

These four research domains are:

- A. Human behaviour
- B. Technical performance
- C. New trends
- D. Land use and transport relationships

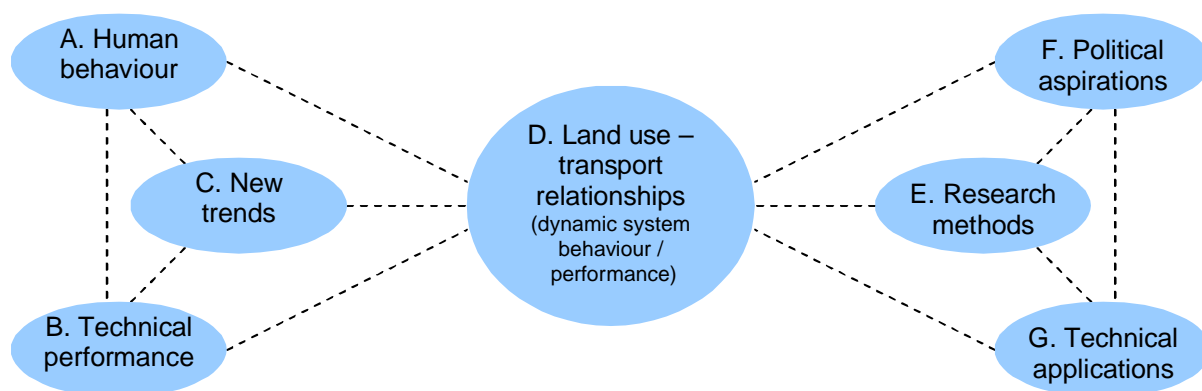
The last three research domains broadly relate to questions concerning how best to gather and use knowledge to inform action:

- How to find out and transmit knowledge concerning the first four domains ,
- How to use this knowledge to formulate policy objectives for the benefit of society collectively,
- How to use this knowledge to develop policy instruments and deliver policy outputs.

The three corresponding research domains respectively are:

- E. Research methods,
- F. Political aspirations,
- G. Technical applications,

The fourth research domain, land use and transport relationships, lies at the core of this set of research domains. In a sense it builds on the first three, and most directly feeds the last three. The seven research domains may therefore be roughly arranged graphically as follows:



In the following sub-sections the seven research domains are explained and examples of research needs identified from the PLUME research are given.

A. Human behaviour

This research domain concerns human needs and motivations, as applied to the land use and transport sphere. It applies to what may be regarded as generally ‘intrinsic’ or ‘invariant’ behaviour, whatever the historical or technological context. Without a good understanding of human behaviour, the cause-effect mechanisms of policy output and public reaction will be uncertain. Land use transport research should therefore keep abreast of the latest findings from disciplines such as psychology, behavioural studies, and other social sciences.

Research needs identified are:

- A1 There is a need to better understand the human motivation for mobility (the psychological and physiological desire to move and travel) over and above the need for accessibility (the ability to get somewhere or access certain services).
- A2 There are two alternative theoretical paradigms identified, regarding human behaviour with respect to land use and transport - travel cost minimisation versus activity

maximisation paradigms. A possibly fruitful research pursuit would be to resolve these paradigms to offer a more effective explanation of human behaviour.

- A3 There are knowledge gaps in terms of self-selectivity - the extent to which people who prefer to walk and use public transport will choose living and working locations whose infrastructure supply matches these travel demands.
- A4 There is a lack of systematic knowledge about the effects of travel demand management policies on mobility behaviour.
- A5 There is a lack of attention paid to the ways in which information provision might influence spatial issues in terms of lifestyle choices. Research into the psychological factors surrounding decisions as to where to work and live, and the ways in which information systems might influence these and assist the evolution of a more sustainable community might be valuable.
- A6 There is a need generally for systematic research into the factors that make walking, cycling and travel by motorised modes (as driver or passenger) enjoyable.
- A7 There is a need to have more sensitive ways of describing people, beyond categories such as 'residents' or 'bus passengers'. For example, to better understand users' opinions, we must ask how individuals identify themselves both in terms of users of the street but also in terms of other social terms. It is probably so that people adopt different roles that become more or less important depending on the current situation they are facing.
- A8 There is need for research to address the human factors involved in influencing the desirability of owning and / or using novel modes of transport.

B. Technical performance

This research domain concerns the technical operation and impacts of the transport and land use system. This is to do with understanding how vehicles interact with infrastructure, and their benefits to and impacts on different users and non users. Land use transport research should therefore keep abreast of the latest findings from disciplines such as mechanical engineering, traffic engineering, highway engineering, and environmental sciences.

Research needs identified are:

- B1 More research is needed to understand the generation and the impacts of some pollutants by transport, in particular fine particulates (below 2.5 μm of diameter) and ozone.
- B2 Research is needed on the ecological impacts of oil and rubber on surface water run-off.
- B3 Research is required to investigate the cumulative impacts of the simultaneous combination of all pollutants arising from transport.
- B4 There is a need for quantification and assessment of indirect or secondary effects of noise – not just impacts on hearing, but on annoyance, interference with communication, performance by school children, effects on sleep, and ischemic heart disease. Clearly, this relates to human factors, although it is assumed here that what constitutes an 'annoyance' or 'health disbenefit' is taken as given.
- B5 Following earlier EC research into innovative modes of transport, there is now a need to undertake full-scale trials of a range of concepts such as personal rapid transit and the cybercar. Perhaps of greatest significance will be the dual-mode vehicle and its development which will need further support.

C. New trends

This research domain concerns the influence of new trends, which arise externally to the land use and transport system, or are adjustments unconsciously arising from within the land use and transport system.

This addresses the introduction of new technologies (other than transport technology covered in research domain 2), the development of new practices, new societal and political trends and circumstantial tendencies – all arising externally to the land use and transport system – plus new trends or tendencies regarding the way in which the existing land use and transport system is used, or adaptation of existing behaviour to new situations (even where the same underlying human motivations or technologies continue to hold).

New trends are accorded a category of its own here, because these represent significant drivers of change, and hence create new variables, new mechanisms and new unanticipated effects. In short, these innovations almost inevitably lead to existing conceptual models and research going out of date, and hence the need for new research. Land use transport research should therefore be aware of general trends in society and the environment.

Research needs identified are:

- C1 There is a need for more research on the likely impacts of teleworking on urban mobility and urban land use.
- C2 There is a need for more research on the likely impacts of e-commerce (teleshopping) on urban mobility and land use.
- C3 There is an urgent need for studies that look into the likely future development of urban freight transport as consequences of developments in logistics, such as supply chain management, just-in-time delivery and e-commerce, and their impacts on congestion and the environment, and possible strategies to make urban freight transport more sustainable by advanced forms of city logistics.
- C4 There is a need for more research on the impacts of the ageing society on urban mobility and consequential location patterns.
- C5 There is a need for more research on how different family size and structure, and spatial distribution of social networks, affects patterns of travel.
- C6 In some parts of Europe, an understanding is needed of the implications of population decline.
- C7 There is potentially a need to address the general historic effects of democratisation, liberalisation, deregulation and accession to the EC, in Central and Eastern European Countries, on location and distribution of land uses, and travel patterns.

D. Land use–transport relationships.

The preceding three research domains are concerned with human behaviour, technical performance and the dynamic effects of new trends. This fourth research domain concerns the dynamic behaviour and performance of the land use and transport system as a whole and in its various parts. It concerns specifically the conceptual and practical relationships between four basic components:

- Land use – i.e., activities taking place in particular localities,
- Physical form of buildings, public spaces and urban areas – i.e., the ‘containers’ of the human activities that constitute land uses,
- Travel – i.e., mobile activities, for getting from an origin to destination, and

- Physical form of transport routes, networks and infrastructure.

In addition to dedicated knowledge about the land use and transport system, an up-to-date grasp of the three preceding research domains is necessary to be able fully to understand this topic.

Research needs identified are:

- D1 There is a lack of reliable empirical evidence to support the arguments made either for or against sprawl. Urban sprawl has negative impacts in general, but there are some interesting exceptions, *such* as “canalising” urban sprawl to secondary spatial concentrations along public transportation lines.
- D2 There should be more research on the economic impact of accessibility on location, e.g., the impact of high-speed rail stations on the prosperity of offices.
- D3 More research is needed fully to understand and make use of land use pricing policies.
- D4 More research is required on the manner in which the availability and use of new modes will influence urban planning and infrastructure planning.
- D5 More detailed understanding of micro-scale land use and transport interactions may be useful, for example, the influence of local environmental and urban design features on travel, and influences on very short trips.
- D6 The effects of infrastructure provision on travel generation are incompletely understood. While some evidence has been collected on road travel, there is not yet a systematic understanding of the effects of provision of pedestrian and cycle infrastructure on travel; nor a systematic understanding of the effect of road infrastructure provision on public transport service provision.

E. Research methods

This research domain concerns the specific mechanisms of research design, execution and dissemination. It concerns knowledge on how to firstly find out and secondly transmit the knowledge of the first four domains in order to assist the last two. The research methods domain here relates to the kinds of research carried out by the research community in its widest sense, including academic researchers and professionals from the public, private and voluntary sectors.

Research needs identified are:

- E1 There is too little easily accessible information for decision makers on appropriate indicators with respect to approximately how much effort must be put into collecting the relevant data to make the indicator useful.
- E2 There is a need for better definition and description of different settlement or land use patterns to assist the testing of the influence of these factors, and hence better prescription of these in planning policies. For example, there is not yet a clear (unambiguous) and consistent use of urban form / land use pattern descriptors.
- E3 There is a need to ensure the availability and comparability of information on urban freight movement across European cities.
- E4 There are gaps concerning reporting of research on management to prioritise different uses / users groups and to assess the effects.
- E5 Methods need to be devised to help technical staff get better access to research results.
- E6 Methods need to be improved to inform politicians about the results of research.

F. Political aspirations

This research domain concerns how to use the knowledge gained from the first four research domains to formulate policy objectives for the benefit of society collectively. In other words, it seeks knowledge not so much about the world as it is, but on the world as it could or should be organised. This necessarily takes account of human needs, collectively, and in terms of long-term quality of life.

Knowledge about political aspirations here relates to the kinds of knowledge used not only by politicians, but by professional and technical staff working on their behalf, and to some extent, the public insofar as they are involved in the policy-making process.

Research needs identified are:

- F1 Operational definitions are required for the general concept of social sustainability. These definitions should take into account basic theories of social justice and equity.
- F2 Methods need to be devised for including these operational definitions of social sustainability in formal appraisal methods.
- F3 The valuation of external costs of pollution is an area in which evidence is inconclusive or misleading.
- F4 There is a need to establish the long-term present cost of global warming, because economic techniques of discounting are not made for such long-term estimations (over at least a century).
- F5 Car use brings with it a range of well-known problems or disbenefits, each of which may be mitigated or eliminated by some solution. But eliminating or minimising one problem requires a readjustment of the perception of the whole problem of the car. For example, if vehicles have cleaner engines, this to some extent reduces the need to restrict vehicle use, but other reasons against unrestrained vehicle use remain. There is a need to establish how best to politically weigh up the different instruments for restraining car use.
- F6 Research is required on how to develop mechanisms for incorporating socially excluded groups into active public participation processes.
- F7 Public participation has been successful in targeting locally defined stakeholders, but it may be difficult to involve specific kinds of travellers who pass through a particular area. There is a need to improve ways of capturing knowledge about the needs of travellers passing through an area or using infrastructure in transit.
- F8 Research is required on how the techniques used in plan-led strategy development processes (e.g., modelling, appraisal, mathematical optimisation) can be used in an overall framework dedicated to encouraging participatory democracy by stakeholders.
- F9 Research is required on how to develop mechanisms to encourage the participation in long-term strategic planning of those who are mainly interested in discussing short-term schemes.

G. Technical applications

This research domain concerns the knowledge needed to develop policy instruments and deliver policy outputs. This effectively concerns the technical and operational practices by which the political aspirations of the preceding research domain are realised. In contrast to research domain two (technical performance), this final research domain is in a sense to do with the 'performance' of the transport and land use planning professionals.

Research needs identified are:

- G1 Some implementation tools (indicator research, land use and transportation modelling) are often not sufficiently well known or used.
- G2 The relevance of land use and transportation modelling outputs is still often hampered by an insufficient understanding of the underlying behavioural and structural mechanisms involved.
- G3 Further development is needed in the range of types of predictive model and the interactions between them, so that cities are better able to use appropriate tools to answer questions at different levels of detail.
- G4 Financial constraints and political considerations often hinder implementation that might otherwise proceed successfully. An important requirement in implementation research is thus, the accessible and detailed documentation of good practice case studies – as well as potential problem areas – to facilitate learning from experience.

6.3 Concluding Comments

While the first four research domains may be regarded as distinct topics – which may be pursued by researchers of different disciplinary backgrounds – they are to some extent interdependent. Therefore, research activity should ‘read across’ from one to another, in order to be able to draw robust conclusions. For example, research into new modes of transport should address not just the technological aspects of vehicles and infrastructure, but should also address human factors associated with uptake of new technology. Land use and transport research should therefore draw from the knowledge of a breadth of disciplines, including but not limited to behavioural science, economics, geography, engineering, technology and environmental science – and the significant linkages between them.

Regarding research domain E (on the issue of generation and transmission of knowledge), there would appear to be merit in closer communications between parallel research teams, and pooling of their research findings, allowing gaps and inconsistencies to be identified and corrected, and allowing standardisation of terms where appropriate, and a common understanding of the key results.

Research domain F (on the question of “how should the world ideally be organised?”), is perhaps less likely to yield universally agreed answers, since each community (whether a village community or the European Community as a whole) will have its own circumstances and priorities. That said, different communities can learn from each other regarding how best to develop and express their aspirations, considering all sections of society.

Research domain G (the question of development and delivery of policy instruments), is perhaps intermediate between the above cases in justifying some degree of collaboration both between researchers and between professionals in different cities.

In each case, it is clear that better communication of key findings from researchers to the ultimate decision-makers – whether these be professionals, politicians, or the public voting on some new transport or land use policy directly or indirectly – will be advantageous. This not only means better communication of certain research findings within a city context, say from a city authority research team to the political leadership, but also better communication of any ‘universally agreed’ key findings from the research community as a whole.

PLUME has served these various purposes: to draw attention to commonly understood findings, as well as to identify gaps and any inconsistencies in findings from research. A further future step would be to address the particular research gaps or inconsistencies identified in PLUME by undertaking new research in the areas indicated.

Finally, it may be suggested that the sustainability paradigm may serve not only as a means of organising evaluation of possible benefits and disbenefits of policy outcomes, but also as a means of airing different facets of societal aspiration in the first place. To date, perhaps, the sustainability paradigm has been mostly a concern of the research, professional and to some extent political communities (the language of transport and planning policy often being couched in terms of sustainability). However, in order to more fully engage the public, perhaps a clearer and more tangible expression of sustainability concepts – or the key social, economic and environmental impacts that they relate to – will be required, in order to effectively generate and then resolve the necessary debates about the policy alternatives and their consequences for the city of tomorrow.

7 POLICY IMPLICATIONS AND CONCLUSIONS

7.1 Integrating land use planning and transport policies for sustainable cities

One important finding of many projects in the land use and transport research cluster was that integrated land use and transport strategies are more successful than isolated individual policies in either field. Findings include:

- Land use and transport policies are only successful in reducing travel distances, travel time and the share of car travel if they make car travel less attractive (i.e., more expensive or slower) and provide attractive land use alternatives to suburban living.
- Land use policies to increase urban density or mixed land use without accompanying measures to make car travel more expensive or slower have little effect as people will continue to make long trips to maximise opportunities within their travel cost and travel time budgets. However, these policies are important in the long run as they provide the preconditions for less car-dependent lifestyles in the future.
- Transport policies making car travel less attractive are very effective in achieving the goal of reducing travel distances and the share of car travel. However, they depend on a spatial organisation that is not too dispersed. In addition, highly diversified labour markets and different work places of workers in multiple-worker households set limits to an optimum coordination of work places and residences.
- Large retail and leisure facilities that are not spatially integrated increase the distances travelled by car and the share of car travel. Land use policies to prevent the development of such facilities ('push') are more effective than land use policies aimed to promote high-density, mixed-use development ('pull').

- Transport policies to improve the attractiveness of public transport have in general not led to a major reduction of car travel, attracted only limited development at public transport stations, but contributed to further suburbanisation of the population.

In general, the impacts of 'pull' measures, e.g., of land use measures, or of improvements in public transport, are much weaker than the impacts of 'push' measures, i.e., of increases in travel time, or travel cost, or other constraints on mobility. In summary, if land use and transport policies are compared, transport policies are far more direct and efficient in achieving sustainable urban transport. However, accompanying and supporting land use policies are essential for creating less car-dependent cities in the long run.

7.2 Developing a sound decision-making process

The successful implementation of the policy recommendations set up by the projects of the LUTR cluster often depends on the ability of decision-makers and of the decision-making process to integrate the elements necessary for overcoming traditional barriers to these policies. Social acceptance is vital for the success of many transport and land use policies and some actions need to be marketed to citizens. It is also necessary to implement frameworks which allow potential legal, institutional, financial, political and cultural barriers to be overcome.

7.2.1 Public consultation

Land use and transport policies directly affect the lives of citizens. Successfully achieving the integration of sustainable land use and mobility policies will often depend on the ability to influence citizen's behavior. To guarantee the best chances of success for these policies, it is therefore necessary to obtain broad support and acceptance within the population. For this reason public consultation is extremely important and is likely to aid the implementation of policies. Public consultation is already recommended by European experts and several land use and transport policies have been developed with public involvement. Consultation with the public also enables the integration of suggestions in potential new solutions. Public consultation and /or participation can take place at different stages of the planning process.

7.2.2 Overcoming barriers – setting the right framework

Many types of barrier can be encountered during the implementation of policies. Many of these barriers could be largely removed if:

- The right institutional and administrative framework is implemented to avoid inter-territorial conflicts relating to the competence and power of different organisations and of different levels of government in relation to taxation of both land use and transport assets and activities, on the one hand, and financing of current and capital expenditure for the provision of public services and infrastructures, on the other.
- Such solutions could provide an institutional setting to allow the problems to be addressed at the right level, overcoming for instance the fragmentation of decision making between neighbouring local authorities for one single metropolitan area. It could also require the implementation of a framework allowing for coordination between

various agencies/organisations to ensure efficient complementarity and integration of policies.

Public-private partnerships can also play a positive role in improving the coordination between various organisations and levels of intervention if:

- A framework is created for encouraging exchanges between international project finance and local property development to allow for the adoption of value capture and innovative finance.
- Project evaluation methods and procedures are enhanced and the risk allocation between public and private sectors is clearly defined.

8 CONCLUSION

The overall objective of PLUME was to “*facilitate the transfer of innovation in the field of planning and urban mobility from the research community to End Users in the cities of Europe in order to improve urban quality of life*”. We believe that this objective has been achieved in the following ways:

- A comprehensive synthesis of research findings and case studies with recommendations as to which policies, measures and tools are best able to meet the need for sustainable development, taking account of user needs and barriers to implementation, has been produced, culminating in the Third State of the Art Review. This final review is a substantial contribution to knowledge in the LUTR field and contains material of considerable value to researchers, decision-makers and practitioners.
- A real dialogue between researchers and End Users has taken place at three workshops.
- A benchmarking exercise to compare planning and urban mobility policies, measures and tools in the End User Group cities has been undertaken.
- Project results have been disseminated via the LUTR website (which was actively maintained by PLUME during the course of the project), and via brochures, newsletters, conference presentations and the final conference in Cologne.
- Active exploitation of the project has taken place through national and regional networks of public authorities and stakeholders and by the organisation of a series national/regional seminars targeted at End Users. In addition the Decision Makers Guidebook (DMG) originally produced by the PROSPECTS project was updated and re-printed as part of PLUME.

Detailed conclusions have been drawn at the end of each chapter throughout this report. The key messages are summarised below. Some of these benefit from the discussions that took place during the final conference and workshop.

1. Better communication of key findings from researchers to the ultimate decision-makers will be advantageous. PLUME has served this purpose by drawing attention to commonly understood findings, as well as to identify gaps and any inconsistencies in findings from research. A further step would be to address the particular research gaps identified by PLUME End Users by undertaking new research in the areas indicated in Chapter 6.
2. The inadequacy of real integration between land use and mobility planning has been evident for many years, and a number of barriers remain. Ideally integrating transport and land use planning needs to be tackled at regional level first, before being tackled at a local (city) level.
3. It is the responsibility of national governments to ensure that regional land use and mobility planning systems are strong enough to achieve good vertical integration (consistency between local and regional plans) and horizontal integration (cooperation

between local authorities within a region). The European Union should set the overall framework and establish standards for good practice.

4. It is important to increase the understanding of the public, politicians and the media about LUTR activities by directly involving them in future research programmes. In order to do this, a clearer and more tangible expression of transport and land use planning concepts and issues is required. In order to influence End Users, PLUME recommendations could be tied into existing European directives on the environment, or could be communicated in new ways, for example in the context of improving the health of citizens.
5. End User regions and cities should be involved in the process from the beginning in order to achieve a more integrated approach between land use and mobility planning. Demonstration projects are an important way of achieving this, but the research institutions are still key so that conclusions can be drawn from the demonstrations.
6. The End User cities participating in PLUME all agree that the network has been of benefit and that European cooperation and networking are positive aspects for improving knowledge and key to the success of achieving integrated policies. The End Users would like the work of the PLUME thematic network to continue and the momentum to be maintained.
7. While the land use and transport research programme has substantially increased our understanding of the requirements for sustainable urban land use and transport strategies, the barriers to implementing them and the potential benefits from doing so, several research needs remain. These are detailed in Chapter 6 of this report and provide an outline specification for a future research programme.
8. There are limited opportunities to continue further research in FP6, including an Integrated Project focussed on land use and a small Coordinating Action looking at scenarios for transport and land use. Furthermore, in order to continue the Benchmarking work carried out as part of PLUME, End User cities have been invited to join the third year of the Urban Transport Benchmarking Initiative to form a Benchmarking group focused on land use and mobility.
9. Whilst FP6 is not particularly relevant to PLUME, it is to be hoped that opportunities will arise in FP7.

ANNEX A
PLUME Newsletter June 2005

PLUME



Newsletter June 2005

LAND-USE AND TRANSPORTATION RESEARCH



ENERGY, ENVIRONMENT
AND SUSTAINABLE DEVELOPMENT

What is PLUME?

PLUME is a Thematic Network within the Land-Use and Transportation Research cluster of the City of Tomorrow key action funded by the EUROPEAN COMMISSION DG RESEARCH.

WHAT IS THE OBJECTIVE?

PLUME seeks to facilitate the transfer of innovation in the field of **planning and urban mobility** from the research community to end users in the cities of Europe in order to improve urban quality of life. This is pursued by reviewing and synthesising concrete results from recent and current projects with the goal of enabling local authorities to develop policies and measures in the field of sustainable development, land use and mobility planning.

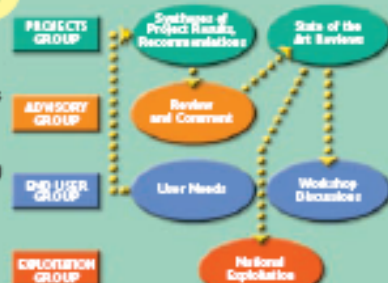


WHAT does PLUME Do?

- undertakes a review of the needs of end-users in the field of sustainable urban development, land-use and transport planning;
- synthesises results of relevant national and international projects and produce an annual state-of-the-art review, providing a readily assimilated summary of best practice in the development of sustainable mobility in cities;
- invites independent experts to review the applicability of the research results;
- establishes a system for benchmarking the performance of cities and LUTR policies;
- facilitates discussions between researchers and end users at a series of workshops;
- disseminates and exploits best practices.

How is PLUME ORGANISED?

The PLUME network brings together experts and end-users with the explicit aim of exploring and exploiting best practices in the urban areas of Europe.



Significant PLUME Outputs

- > **Annual State of the Art Review**
Summary of the Land Use and Transport Research projects reviewed by PLUME in order to stand as guidance on the latest research outcomes in the field of integrated land-use and transport planning
- > **Report on User Needs, Barriers and Gaps**
Synthesis work of PLUME identifying the areas in which End Users in cities require guidance;
- > **Report on Benchmarking Urban and Mobility Planning**
Data on the benchmarking of land-use and mobility planning in order to enable cities to compare their own performance with that of others, and to identify areas where they should seek to make progress.

THE EXISTING LUTR PROJECTS

The relationship between transport and land-use planning is the key concern of the projects within the DG RESEARCH LUTR Cluster. The work of these projects was firstly synthesised within the ASTRAL Concerted Action, whose work provided the starting point for the activities of PLUME. The cluster now comprises 12 projects: ARTISTS, ASI, CITYFREIGHT, ECO-CITY, ISHTAR, PROMPT, PROPOLIS, PROSPECTS, SCATTER, SUTRA, TRANSPLUS, VELO-INFO.

In Sweden,

the Swedish Association of Local Authorities and the City of Stockholm organised two PLUME 'Forums for sustainable traffic planning and urban development' in June 2004 and April 2005.

The Forums aimed at showing good international and Swedish examples of how decision-making and integrated town planning and transport planning support sustainable development in cities and regions, for example providing alternatives to the private mode.

City officials and politicians from the municipal and county level responsible for traffic, streets, environment and land-use planning were the main target groups.

The key conclusions were:

- There are many examples of innovative planning across Europe;
- Successful delivery is mostly function of the institutional and legal context rather than a consequence of technical solutions;
- Seemingly attractive projects may be hard to implement;
- Radical solutions can be implemented with good planning;
- The scope of multi-disciplinary working is considerable and not yet fully explored.

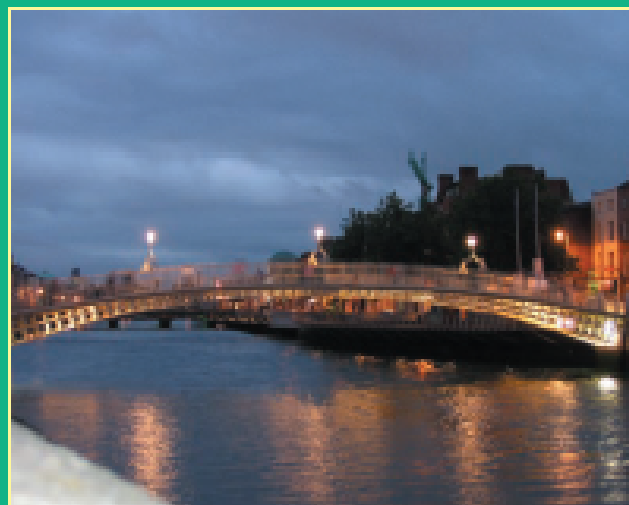


In Ireland,

the Centre for Transport Research of the Trinity College Dublin organised a PLUME workshop in February 2005.

Case studies from the three main metropolitan areas in Ireland (Belfast, Cork and Dublin) were presented and discussed, providing an overview of the current situation in Ireland and a forum to share experiences.

The workshop also enabled discussion on common barriers to achieving a sustainable urban environment.



In France,

CERTU organised a National PLUME Conference in Paris in March 2003, attended by more than 150 specialists in urban activities (technicians from local communities and state services, elected representatives and academics).

The main objective was to draw up an overview of the policies undertaken in different European countries for improving coordination between urban planning and transport.

The following main questions steered the discussion:

- **Transferability:** to what extent can urban planning and transport integrated policies conducted in foreign countries be transferred to France? Do they depend on specific country conditions (institutional, geographical, cultural, etc.)?
- **Density:** from compact cities to polycentric cities, which urban form corresponds to the dense city model that favours sustainable mobility?
- **Assessment:** due to the complexity of relations between urban planning, transport and life styles, are we meaningfully capable of isolating and appraising the impacts of urban policies on mobility practices?
- **Real estate and accommodation:** how to reconcile the need to keep control over urban sprawling, which induces high level of car use, with the extremely taut real-estate and property market? And how about the ever growing desire of populations to live in single homes in peripheral areas?

Although the extremely rich debate was not able to provide definitive answers to all these questions, it did succeed in opening up several paths of reflection, which will need to be looked at in closer detail.



In Spain,

TRANSyT, the Centre for Transport Research of the Madrid Polytechnic University, organised a PLUME Seminar on "Planning and Urban Mobility in Europe" in Zaragoza in June 2004.

The event thrives organised in the framework of the VI Spanish National Conference on Transport and raised an animated debate and some interesting conclusions on how to best make use of the conclusions of the Land Use and Transport Research in Spain. Specifically:

- Set up of "mobility audits" in all urban plans on an obligatory basis. This could be done at local planning level and even imposed to the single private developments;
- All urban developments should prove their coherence with the city mobility plans (supposing the city has one) or, if not, develop one of their own;
- Creation and maintenance of National (or local) networks with data on air quality, mobility, etc., in short, all data not found in EUROSTAT.



In Italy,

APAT, the Italian Agency for Environmental Protection, hosted in February 2005 a PLUME Seminar on "Mobility and Urban Sustainable Development".

The Seminar discussed the key challenges facing the urban environment and presented the merits of integrating land use and transport policies as a way to answer these challenges in the medium to long term.

Key messages coming from the PLUME research, as well as some case studies presented at the Seminar (i.e. the congestion charging in London, the land use and transport policies in Stockholm, the cases of Naples and Genoa in Italy) all converged on the need of policies integration.

The main reasons being:

- To deal with complex urban systems through single measures may be useful, but rarely sufficient.

There is no single solution to urban mobility and sustainable development applicable universally and/or in isolation.

Typically, improving public transport alone is not a solution to urban congestion as complementary measures are needed such as limiting the access to private vehicles in the most congested zones, improving accessibility to public transport, and planning more dense and mixed land uses;

- The combination of policies to achieve synergies has in principle been accepted.

However, we need a wider knowledge and better proof of the effects of packages of transport measures (including carrots and sticks) in the short, medium- and long-term;

- Finally, there is the need to raise awareness of sustainability challenges and possible solutions throughout the complex web of institutions – local, regional, national – that are usually involved in ensuring the coordination of planning and implementation of policies.

Awareness is the basic pre-requisite to overcome the barriers to the integration of policies.



Overview of key findings from PLUME research

Problems and challenges

ENVIRONMENTAL: While vehicle technology improvements have led to a reduction in many local pollutants, cities still face serious environmental challenges. Local air pollution remains a problem, and its impacts on human health are now more widely understood. Noise has been overlooked as a problem in many European countries, but is likely to attract increasing emphasis as its implications on health and quality of life are now more extensively recognised. Other local environmental impacts on the cultural heritage are less well understood, although research in ISHTAR has documented the scale of risk to historical monuments. Transport in cities is also a major contributor to global warming, and needs to be fully integrated into strategies for reducing greenhouse gases.

SOCIAL ISSUES: Social sustainability challenges include the impacts of access restriction, congestion and the environment on quality of life; the social costs of accidents and lack of personal security; and the unbalanced distribution of costs and benefits across society. Among these, the costs of accidents are best understood and quantified. Accident rates are falling in most cities, but additional action is needed to further reduce their impact, particularly on the most vulnerable users of the road system. Most cities are giving greater emphasis to distributional issues and the reduction of social exclusion, but the the problem dimension remains less well understood and policy is largely driven at a political level rather than by transport issues. Quality of life remains a relatively vague concept in urban planning.

ECONOMIC CHALLENGES: Congestion is a major challenge to economic sustainability, and is expected to continue to increase rapidly unless remedial action is taken. The costs of congestion, and the direct costs of provision and use of the transport system, are well understood. Considerable work has also been undertaken in connection with the external costs of transport, but the implementation of solutions to internalise such costs as a mechanism to manage travel demand has been limited. Behavioural solutions offer an alternative to fiscal policies but are equally complex to implement.

Policies

LAND USE PLANNING: While land use measures on their own may have a limited impact on travel patterns, they do enable public transport to be more effective, and can avoid relocation in response to road pricing. The principal elements in an effective land use strategy are to focus development in centres and on public transport corridors, to maintain sufficiently high densities to support public transport, walking and cycling, and to reduce the provision of parking space. Where transport investment leads to an increase in land value, notably in urban metro investment corridors, land-value taxation may provide a mechanism by which transport costs can be recouped.

INFRASTRUCTURE PROVISION: With a range of alternative lower cost policy measures available, infrastructure investment, in roads or in public transport, will often prove to be a less cost-effective solution. Moreover, it can stimulate growth in journey lengths, which may jeopardise the pursuit of sustainability. Any such investment should be designed to be fully integrated into an overall strategy, so that it can focus on bottlenecks and gaps in the network, while avoiding the generation of additional travel.

INFRASTRUCTURE MANAGEMENT: Road space needs to be managed more effectively, by allocating appropriate priority between general traffic, public transport, walking and cycling, frontage access and public space. While most urban streets will be multi-functional, a balance should be determined for each street between its link status and its place status. A range of cost effective measures is available to enhance link and place status as appropriate.

PUBLIC TRANSPORT: Public transport services can be improved most effectively by increasing the quality of the services, e.g. improving reliability and operating speeds, reducing and simplifying fares, enhancing the quality of the vehicles, supporting infrastructure, interchange options and information systems. Such interventions must be underpinned by marketing initiatives to ensure that regular car users are aware of improvements in service quality.

TRAVEL DEMAND MANAGEMENT: Travel demand management measures have become more popular in recent years as a way to make urban transport more sustainable. Marketing efforts, company travel plans, ride sharing (car pools) and car sharing initiatives have proved to contribute to at least slowing the increase of car travel. Flexible working hours also contribute to decreasing peak-hour congestion but not the km-vehicle travelled overall. There is recent evidence that teleworking, due to its interaction with residential location choice and other trip purposes, has only little effects on vehicle-km travelled per person per day, but on a weekly basis teleworkers do travel less than non-teleworkers. The effects of teleshopping (e-commerce) on urban sustainability are as yet less certain. Attitudinal and behavioural measures can prompt individuals to consider alternatives to car use, promote specific public transport services, and stimulate walking and cycling. They have the added value of being a positive, rather than negative, means of controlling car use. However, the scale of their impact remains uncertain, and it is unlikely that they will ever remove the need for effective pricing of car use.

INFORMATION MEASURES: Radio, TV or Internet-based traffic information systems or on-board navigation systems enable drivers to avoid congested areas. However – although there are some notable experiences showing high cost/benefit ratios - it has yet to be ascertained whether the high expectations put into these technologies are fully justified. Public transport passenger information systems and mobility centres serve a different goal to improve access to public transport also for people without local knowledge or mobility handicaps.

PRICING MEASURES: Controlling the growth of car use is essential if sustainability is to be increased. While regulatory measures, and vehicle speeds controls can prove to be successful, pricing is likely to be the most effective measure in this respect. Ideally, this should be implemented through a road pricing scheme, though parking charges can provide an effective alternative. Such pricing policies remain widely unpopular, but public aversion can be reduced by combining pricing measures with public transport improvements in an integrated strategy.

WALKING AND CYCLING: Walking and cycling are important modes in most European cities, and can provide for a significant proportion of journeys. They offer an effective alternative for some car journeys, provide access to public transport, and may also help relieve congestion on heavily used public transport corridors. They need to be fully integrated into the overall strategy by providing for them effectively in land use plans and in the reallocation of road space.

URBAN FREIGHT TRANSPORT: While most of the urban transport policies relate principally to passenger travel, freight movements are a significant element in urban travel, and are predominantly road based. Freight is often overlooked in urban transport planning, but has important contributions to both environmental and economic sustainability. An integrated strategy as outlined above can help freight transport to be more efficient. Within that context, freight transport 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.

VEHICLE TECHNOLOGY: Cleaner cars (three-way catalysts) have in the past greatly contributed to reducing atmospheric pollution in cities. More energy-efficient cars are available on the market but have a small market share because fuel is still relatively inexpensive. The role of vehicle technology may become more important as fossil fuels will become more expensive in the future. Technological advances making cars safer have contributed to reducing the number of fatal accidents. New technology will have a continuing role in making vehicles safer and less polluting, and in reducing the emissions of greenhouse gases.

INNOVATIVE MODES: Personal rapid transit systems combine the advantages of public and private mobility, i.e. offer some of the advantages of the private car without its environmental costs. Advanced driver assistance systems or automated vehicle guidance systems reduce congestion and accidents and to a certain extent also emissions. These new modes may offer effective alternatives to the car and conventional public transport in the longer term, but their potential remains to be demonstrated.

INTEGRATED STRATEGIES: A key message from several projects is that an integrated strategy will be more effective than one, which focuses on a limited set of measures. Successful integrated strategies use combinations of policy instruments to achieve synergy and to reduce the barriers to their implementation. The three principal elements of a successful integrated strategy are enhancements to public transport, pricing of car use, and land use policies designed to reinforce these two measures.

Processes

SETTING TARGETS: The essential starting point for an effective land use and transport strategy is a clear set of policy objectives. These can be identified in the context of the three elements of sustainability –environmental, economic and social-, but also need to address the impact of transport on other areas of public policy, such as health and social inclusion. Once the objectives have been identified, outcome indicators should be specified which measure performance against these objectives. These in turn can be used to identify problems, to suggest solutions, and to monitor progress in overcoming those problems. Targets can be a valuable stimulus to strategy development and implementation, but need to relate to the agreed outcome indicators, and to be internally consistent. They may best be specified once the overall strategy has been agreed, and then used to monitor the achievement of the strategy.

STRATEGY DEVELOPMENT: Strategy development should be based on the agreed objectives and focus on the identified problems. Option generation remains an art rather than a science, and has become more challenging as the range of policy instruments has widened. Several LUTR projects have identified good practice in strategy development, including the importance of considering the full range of policy instruments, and formulating integrated strategies based on them. Such integrated strategies need to focus on achieving synergy, or at least complementarity, between the measures, and in helping to overcome the barriers of acceptability and finance. Optimisation techniques are now available to help in the design of such strategies.

STRATEGY IMPACT FORECASTING: A wide range of techniques is available for strategy forecasting. However, urban transport systems are complex, and for most applications predictive models are essential in understanding the impacts of proposed strategies. Several LUTR projects have demonstrated the application of such models, and provided advice on modelling practice. The main barriers to progress are the availability of skilled staff in cities; cities' own unfamiliarity with models, and the availability of good databases for model construction, calibration and validation.

STRATEGY APPRAISAL: Strategy appraisal needs to be based on the agreed set of objectives. The principal methods are cost benefit analysis and multi-criteria appraisal. The former relies on the ability to place money values on all objectives and impacts. As the range of objectives widens, this becomes more difficult. Multi-criteria appraisal is more flexible, in that it can use money values, quantified impacts or qualitative impacts as appropriate, and can reflect differing weights between objectives. Neither method is particularly well designed to reflect distributional impacts or to appraise aspects of social justice; this remains an area for further development.

PUBLIC PARTICIPATION: Public participation can contribute positively to all the above elements of strategy development, including agreement on objectives, problems, indicators and targets; input to option generation; checking forecasts; and appraising options. A range of methods is available; those which promote more active involvement are more expensive but more effective. While such participation may add to the time taken for strategy development, it is likely to simplify the subsequent process of implementation.

STRATEGY IMPLEMENTATION: Good practice in implementation is less well understood, and has attracted less research, than other elements of the strategy development process. However, research in TRANSPLUS has demonstrated that pursuit of integrated strategies, effective collaboration between disciplines, agencies and tiers of government, and active public participation all help to streamline implementation. A staged implementation process may also help, provided that a balance is maintained between pull and push measures and hard and soft policies.

FINANCING: Financing problems and methods were addressed only in few of the projects. PROPOLIS and PROSPECTS addressed methods of cost analysis and TRANSPLUS looked into different financing methods. Financing of policies applies equally to land use planning and infrastructure provision and pervades all phases of the planning process.

INSTITUTIONAL ISSUES: Institutional issues of policy implementation were addressed in many LUTR projects, most notably in PROSPECTS and TRANSPLUS. Urban problems have long exceeded the jurisdictions of individual local governments. Therefore issues of centralisation/decentralisation and the role of public and private actors have to be reviewed.

LUTR Website www.lutr.net

LUTR HOME
GLOSSARY
STATE OF THE ART
TARGET AUDIENCE DB
CITY DB
DELIVERABLES
LINKS

State of the Art | **Target Audience DB** | **Cities DB**

Land Use and Transportation Research: Policies for the City of Tomorrow
The LUTR cluster links several different projects in the area of sustainable urban mobility, including land use, transportation, and the environment. The common objective is to develop strategic approaches and methodologies in urban planning that all contribute to the promotion of sustainable urban development. This includes issues of transportation demands and related land use planning, the design and provision of efficient and innovative transportation services including alternative means of transportation, and the minimisation of negative environmental and socio-economic impacts.

NEWS & EVENTS
04 March 2004
[The Journal of Architecture, Research & Urban Planning 2004 National Prize, Bucharest](#)
22 April 2004
[CODATU XI call for papers Bucarest-Romina](#)
Comment: romanian transport: urban plus attractiv?
19 May 2004
[20th International Conference on Urban Transport and the Environment in the 21st Century](#)

[Contact Us](#)

CLUSTER PROJECTS

ARTISTS	ALL	CITY PRESENT	SOCIETY	CENTER	GROUND
PEOPLE	PROJECTS	SCATTER	SUTRA	TRANSPLUS	VELOINFO

The European Commission
Community Research

A research project supported by the European Commission under the 5th Framework Programme and contributing to the implementation of the Key Action within the European Commission and Sustainable Development Contract n. 4-044-CT-2000-0001

PLUME Contacts

PLUME is co-ordinated by TTR (UK) working in partnership with ITS Lead: (UK), GIS (I) and POLIS (B).
EC official in charge: Eric PONTHEU (E) Eric.Pontheu@cec.eu.int.
Information on PLUME and related LUTR projects can be found at www.lutr.net.
For more information on PLUME, and to register your interest in receiving project updates,
please e-mail to Baker at PLUME@TTR-LTD.COM

