

**Procedures for Recommending Optimal Sustainable Planning
of European City Transport Systems**

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Cities' Decision-Making Requirements

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ENERGY, ENVIRONMENT
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Preface

PROSPECTS (Procedures for Recommending Sustainable Planning of European City Transport Systems) is a project funded under the European Commission's Environment and Sustainable Development Programme. It is designed to provide cities with the guidance they need in order to generate optimal land use and transport strategies to meet the challenge of sustainability in their particular circumstances. The PROSPECTS consortium is led by ITS, University of Leeds (Great Britain) and includes the partners TUW (Austria), TØI (Norway), KTH (Sweden), UPM (Spain) and VTT (Finland).

This document is the report on Work Package 10 of PROSPECTS, for which VTT has had the responsibility. It is the first formal deliverable of the project. The report was edited by VTT, Work Package 10 leader. The partners responsible for separate tasks of the work package have written the parts of their concern: Task 11 by TØI, Task 12 by KTH, Task 13 by ITS, Task 14 by VTT, Task 15 by UPM and Task 16 by ITS. The coordinator and the work package leader have been responsible for the common parts of the report. All PROSPECTS partners have contributed to the work on all tasks of the work package.

Finally, we wish to express our gratitude to representatives of planning authorities, politicians and organisations in the six core cities of Edinburgh, Vienna, Oslo, Stockholm, Madrid and Helsinki MA for their contribution during a series of interviews. The views expressed by the interviewees have however been personal and do not necessarily reflect the standpoints of the cities. We would also like to thank representatives of the nearly sixty cities in Europe who have taken the trouble to take part in the wider city survey.

Espoo, March 2001

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CITIES' DECISION MAKING REQUIREMENTS

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Summary

This report is the first deliverable of PROSPECTS: Procedures for Recommending Sustainable Planning of European City Transport Systems. PROSPECTS is funded under the European Commission's Environment and Sustainable Development Programme. It is designed to provide cities with the guidance which they need in order to generate optimal land use and transport strategies to meet the challenge of sustainability in their particular circumstances.

The report presents the results of the first work package of the project which reviews cities' decision-making requirements. The starting point of the project has been the expectation that there will be, across Europe, a wide range of different approaches to decision-making, to which the project's recommendations need to relate. Initial work was conducted with six Core Cities: Edinburgh, Helsinki MA, Madrid, Oslo, Stockholm, and Vienna. Since these cities are not typical of the full range of European cities, the initial results from the Core Cities were used to produce a questionnaire survey which was circulated to around 100 cities, drawn from across Europe.

This report is structured around the five initial tasks of the work package. Section 2 reviews the broad approaches to decision-making; Section 3 objectives and indicators; Section 4 trends and scenarios; Section 5 policy instruments; and Section 6 barriers to implementation. Conclusions are drawn in Section 7, as summarised below.

The review of decision-making processes has demonstrated that they are complex, and differ considerably from one city to another. Most cities consider that their decisions are based on a combination of objective-led and consensus-led approaches, but there is considerable diversity. Cities are more likely to have direct responsibility for land use and traffic management and more likely to share responsibility for infrastructure; public transport services, information and pricing are more likely to be the responsibility of others. Cities' decisions are often strongly influenced by adjacent authorities and national government; the impact of regional authorities depends on the local government structure; the EU currently has only limited impact. While the majority of cities develop medium and long term plans, the time horizons vary considerably. Public involvement ranges from intensive participation to limited involvement in public inquiries on specific projects. Cities are most likely to involve the business community in their decisions, and least likely to involve the media. The business community is considered to have the greatest influence on decisions, followed by the media and environmental groups; transport users are considered to have the least influence.

The surveys conducted in this work package have confirmed the appropriateness of the project's initial conceptual structure. Based on this an overarching sustainability objective and six key sub-objectives have been defined; the key attributes of past trends and future scenarios have been identified; a list of 80 potential policy measures has been developed; and the main barriers have been categorised as legal, financial and political. Issues on which further work is needed have been identified.

The importance of the objectives, scenario attributes, measures and barriers varies by type of city. Smaller cities placed more emphasis on population growth, and less on economic growth, past trends and future scenarios. Smaller cities were less interested in awareness campaigns, rail infrastructure, bus priorities and real time information; medium sized cities placed greater emphasis on parking charges and less on road pricing; large cities were less concerned with land use policies and fares. Large cities were more likely to experience legal barriers on infrastructure projects and pricing measures. Small cities were more likely to perceive political barriers to pricing measures, and large cities to infrastructure projects.

1 Introduction

1.1 Overall objectives

This report is the first deliverable of PROSPECTS: Procedures for Recommending Sustainable Planning of European City Transport Systems. PROSPECTS is funded under the European Commission's Environment and Sustainable Development Programme. It is designed to provide cities with the guidance which they need in order to generate optimal land use and transport strategies to meet the challenge of sustainability in their particular circumstances.

The report presents the results of the first work package of the project: Work Package 10, which reviews cities' decision-making requirements. The starting point of the project has been the expectation that there will be, across Europe, a wide range of different approaches to decision-making, from formal objective-based strategy formulation, through consensus-based development of acceptable policies, to actions determined, with limited consultation, by visionary leaders. If the recommendations from the project are to be of value to all European cities, they need to be relevant to all of these styles of decision-making. The purpose of the work package was therefore to investigate, and catalogue, that range of decision-making processes.

As with other parts of the project, the initial work has been conducted in close collaboration with a set of six Core Cities, who have committed themselves to contributing intensively to the project. The approach adopted is described in section 1.2. These six cities, one from each of the partners' countries, are Edinburgh, Helsinki, Madrid, Oslo, Stockholm, and Vienna. These cities are, of course, not typical of the full range of European cities; they are all capital cities, with an economy which is determined largely by that function, and they are all relatively large. To remedy this, the initial results from the Core Cities were used to produce a questionnaire survey which was circulated to around 100 cities, drawn from across Europe, in Task 16 of the work package, as described in section 1.3. The results of both stages of the work package are presented together in sections 2 to 6.

This report is structured around the five initial tasks of the work package, although it takes them in a slightly different order from that in which they were conducted. It starts, in section 2, with the results of Task 14, which reviewed the broad approaches to decision-making. This task was in many ways the most complex of the work package, since there is a relatively limited literature on decision-making, and it was felt better, therefore, to conduct it after having gained some experience of the issues in the Core Cities. However, it logically comes first in this report, since it provides a context in which the more detailed processes can be described.

The conceptual approach for the remaining tasks, as described in sections 3 to 6, is set out in Figure 1. It is assumed that cities start with a perception, explicit or implicit, of the objectives which they are trying to achieve through their land use and transport strategies. Since the focus of the project is sustainability, this is first defined, and the remaining objectives are then treated as subordinate to this. These assumptions, and the definitions of sustainability and of the sub-objectives, are then tested first with the Core Cities and then with the Survey Cities. These objectives, it is assumed, can then be used to identify problems, both now and in the future, which are evidence of the objectives not being achieved. This can be facilitated by specifying a series of performance indicators related to each of the objectives. Again, this concept and the definition of the indi-

cators is tested both with the Core Cities and with the Survey Cities. This forms the content of Task 11, and is presented in section 3.

In explaining current problems it is assumed that cities may wish to develop an understanding of past trends. Equally, in assessing future problems, it is assumed that cities may wish to consider a range of future scenarios. As an extension, they may wish to pursue an approach based on scenario planning, in which the robustness of strategies is assessed against a range of possible futures. For both trends and scenarios, the parameters are a set of factors exogenous to the transport system, but which directly influence its performance. These concepts were tested with the Core Cities in Task 12, and the results of this, and the subsequent views of the Survey Cities, are presented in section 4.

Once problems have been identified, it becomes possible to consider solutions, which can be drawn from a wide range of possible land use and transport measures. The project benefited from access to an earlier UK review of the range of policy measures, and their potential impacts. In Task 13 the Core Cities were asked which of these they were actively pursuing, which they were not, and whether there were others which they were considering which were not included in the initial list. The discussion also considered approaches to combining these measures into integrated packages. The results of this task, and the subsequent responses from Survey Cities, are reported in section 5.

While the preferred measures from Task 13 might reasonably form the basis for developing suitable strategies, there will in practice be some barriers to their implementation. Interviews with the Core Cities in Task 15 were used to catalogue the possible barriers, and ways of overcoming them. The results of this task, and the subsequent views of Survey Cities, are presented in section 6.

All of these results will provide an input to the next stages of the project, which consider evaluation requirements, in Work Package 20, and modelling tools, in Work Package 30. Conclusions from this work package, and recommendations for the subsequent work packages, are presented in section 7.

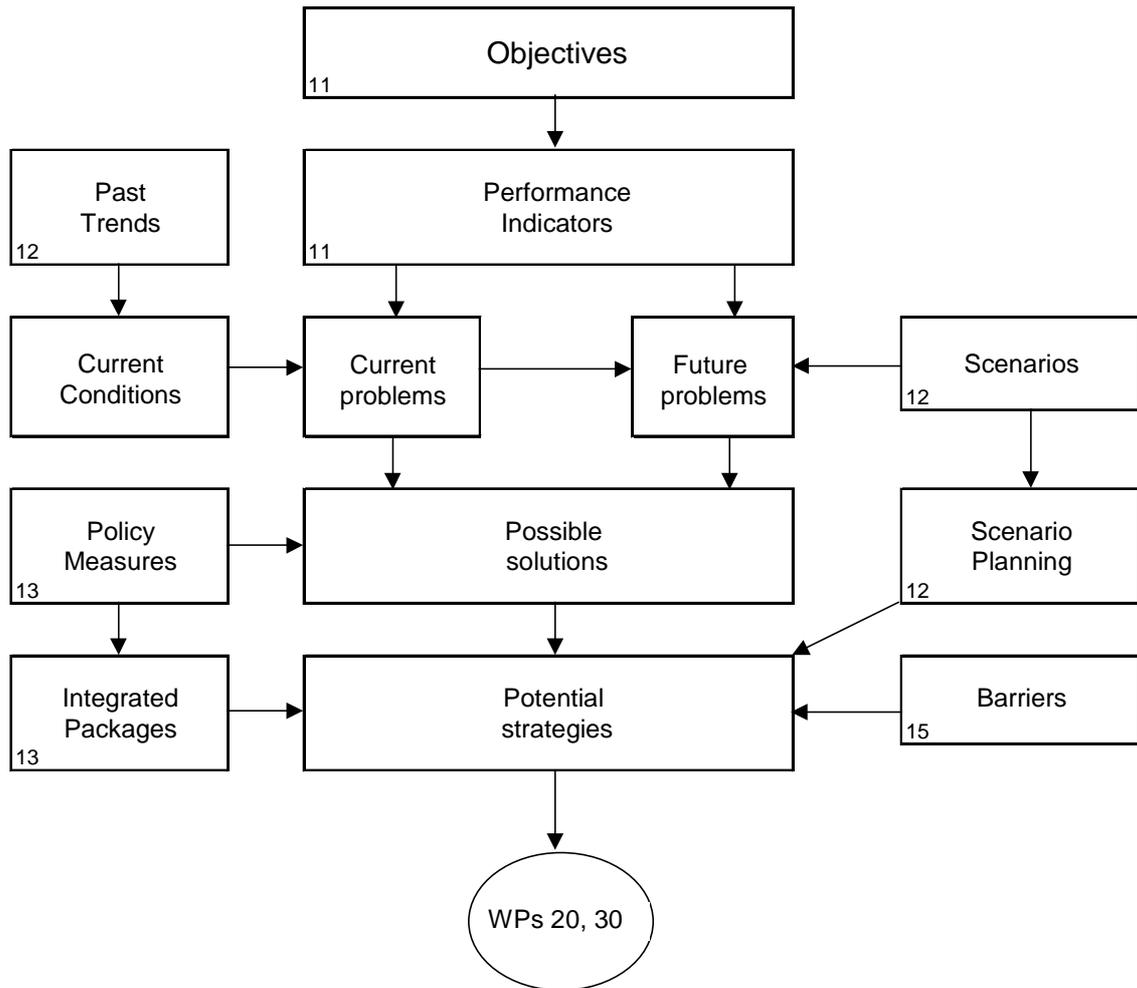


Figure 1 The Conceptual Structure of Work Package 10 (Task numbers shown thus: 12)

1.2 Overview of method, interviews and surveys for tasks 11-15

The preparatory work done in Work Package 10 was based on a literature review including previous EU-funded projects as well as on partners' expertise and practical experience.

In addition to the literature review personal interviews played a key role as the method for reviewing cities decision making requirements. The partners conducted a series of detailed discussions with our six Core Cities (Edinburgh, Oslo, Stockholm, Helsinki, Vienna and Madrid) to help specify their approaches to decision-making (Task 14); the objectives and indicators which they use (Task 11); the scenarios which they consider in planning for the future (Task 12); the range of policy measures which they employ (Task 13); and the barriers to their use (Task 15).

The first and second rounds of interviews were addressed mainly to city authorities responsible for transport and land use planning while the third one covered all stakeholder and interest groups. The main subjects of the first round were Tasks 11, 12 and 13, the second covered Task 12 more fully and additional or supplementary questions related to tasks 11 and 13 according to responses to the first round. The main subjects for the third round were issues related to Tasks 14 and 15, but remaining issues from Tasks 11 to 13 were also pursued. Given the number of respondents, questions were

pursued selectively. The full questionnaires can be found as appendices in each individual Task Summary Report, copies of which can be obtained from the Coordinator.

1.3 Task 16: City survey

As noted in section 1.1, the city survey in Task 16 was designed to assess how transferable the results from the Core Cities, in Tasks 11 to 15, were, and to obtain a wider range of views of cities throughout Europe. To this end, a structured sample was selected of cities in all the European Union countries, together with Norway, Switzerland and the Accession Countries. The intention was to select a sample of cities in the population range 20,000 to 2,000,000, thus excluding only the very largest cities, which can be expected to have rather different needs. The sample size was related broadly to the country's population, with between three and ten cities, depending on size, for EU members, Norway and Switzerland, and between two and five for the Accession Countries. In practice the upper bounds were relaxed in a few cases where other cities were keen to contribute. An attempt was also made to provide a geographical coverage of each country, and to include both economically buoyant and economically deprived cities in the sample. Subsequently, for completeness, the Core Cities were also invited to complete the questionnaire. In total, questionnaires were sent to 109 cities, as shown in Table 1. By the end of November 2000, responses had been obtained from 54 cities, as also shown in Table 1. Further responses are being encouraged, and the results will be updated at a later stage in the project as a sequel to this report.

Table 1 Wider city survey

Country	Questionnaires sent	Responses Received	Country	Questionnaires sent	Responses Received
Austria	5	2	Latvia	2	0
Belgium	2	1	Lithuania	2	2
Bulgaria	3	2	Poland	5	2
Czech Republic	5	1	Portugal	5	2
Denmark	3	0	Netherlands	3	0
Estonia	2	0	Norway	4	3
Finland	2	2	Slovakia	2	0
France	9	9	Slovenia	2	0
Germany	10	3	Spain	11	10
Greece	4	0	Sweden	5	3
Hungary	5	0	Switzerland	2	2
Ireland	2	2	UK	10	7
Italy	4	1	Total	109	54

Table 2 summarises the details of the 54 cities from whom responses were obtained, by size and location. The respondents represent a cross-section of sizes, with 26% from small cities of under 100,000, 37% from medium sized cities, and 35% from larger cities of over 250,000. While most of the responses were from western cities, with 46% from northern countries, and 41% from southern ones, 13% were from eastern accession countries. Further details are provided in Appendix 5.

Table 2 Characteristics of survey cities

	Less than 100	100-250	Greater than 250	NS
Eastern	2	1	4	0
Northern	8	10	7	0
Southern	4	9	8	1

The questionnaire was designed to be answered relatively quickly by the respondents, and was therefore kept brief and focused on the key issues from Tasks 11 to 15. It consisted in total of a set of twenty questions, addressing in turn the issues considered in sections 2 to 6. Where possible, questions were designed to be answered by ticks and crosses, to limit the problems of interpreting text answers in a range of languages. To provide more detail, a three page summary was provided of the results from the consultations with the Core Cities, with the sections in the summary presented in the same order as, and cross-referenced with, the survey questions. To assist respondents, the questionnaire, which was initially composed in English, was subsequently translated into French, German, Italian and Spanish. A copy of the questionnaire and summary of city characteristics is provided in Appendix 5 The full report on Task 16 can be obtained from the Coordinator.

2 Task 14: Decision Making Processes

2.1 Organisational structures

Cities' decision making contexts may have substantial differences depending on the operational environment and the administrative structure adopted in each country and city (Le Gales, 1998; Page, 2000). Some cities are fairly autonomous municipalities but some cities are composed of several separate municipalities with autonomous and joint decision making organisations. In addition, the national and regional administration may have an influence in the process; especially the commuting municipalities may need to be considered.

The six core cities as regarded in this study are all except Vienna composed of several municipalities the main municipality being the city (regarding core cities the capital) giving the name of the metropolitan area. Oslo MA is composed of the city itself and 22 municipalities, Helsinki MA of four independent cities, Edinburgh MA of four, Madrid MA of 49 and Stockholm MA of 26 municipalities. A more detailed description of core cities' decision making structure can be found in Appendix 1.

2.2 Approaches to decision-making

Our survey identified three distinct approaches to decision-making which may be adopted in any particular city:

1. Vision-led: an individual or committee has a clear vision of the measures needed to improve transport and land use in the city, and focuses all action on implementing them
2. Plan-led: objectives are specified, and the measures which best satisfy these objectives are determined, usually by analysis; the resulting plan is then implemented.
3. Consensus-led: discussions take place between the stakeholders involved in transport and land use, and the measures implemented are those which attract the greatest support.

In recognition that these three approaches are necessarily simplified, cities were asked to state whether their decision-making process 'tended' to any of the above approaches or was some mix of the above approaches. Table 3 shows the results obtained.

It can be seen from Table 3 that the most common approach amongst our survey cities was some mix of plan-led and consensus-led decision-making and that the least common approaches were those which tended either towards vision-led or towards plan-led decision-making. Table 3 also shows that amongst northern European cities (and amongst eastern European cities although there were fewer of these) there is a higher preponderance of cities who adopt approaches which are a mix of plan-led and consensus-led.

Closer scrutiny of responses, disaggregated by size of population, reveals that 14 out of the 19 larger cities (those with population greater than 250000) adopted an approach which was a mix of plan-led and consensus-led, whilst there was more variation in the type of approach amongst medium-sized and smaller cities.

Table 3 Approaches to decision-making

Country Type	Tending to 1	Tending to 2	Tending to 3	A mix of 1 & 2	A mix of 1 & 3	A mix of 2 & 3	NS
Eastern	0	0	0	2	1	4	0
Northern	1	2	2	5	3	12	0
Southern	1	0	5	5	3	7	1
Total	2	2	7	12	7	23	1

2.3 Decision levels

The purpose of this section is to illustrate the levels at which different decisions are made as a part of the formal process. We can distinguish between the EU, national, regional and local decision making levels. In this context the regional level covers both county and region levels and local level refers to municipality or city and metropolitan area levels of decision making. In some cases even sub-city level may be important and has to be distinguished.

Although decentralised, the decision making at the regional and local levels may be to some extent regulated or supervised by authorities at a higher level. An important question is the extent to which local authorities have autonomy in their decision-making, or are subject to higher level verification.

2.3.1 Responsibilities

Table 4 summarises that extent to which individual policy areas are the sole responsibility of the core cities. In most cities, land use and traffic management are the sole responsibility of the city, perhaps with other agencies having a minor role. Conversely, infrastructure projects are predominantly the responsibility of others. Bus and rail service levels, information and pricing are shared in different ways in different cities. In practice, the position is not clear cut. Most cities commented that more substantial decisions involved other higher level organisations. Regional cooperation was a key issue for most cities; regional structures are in place in Helsinki, Madrid, Oslo and Stockholm, and were in operation in Edinburgh until 1996. Only in Vienna have they not been considered necessary.

Table 4 Responsibilities in core cities

(E = Edinburgh, H = Helsinki, M = Madrid, O = Oslo, S = Stockholm V = Vienna)

Measure	Your Responsibility		Joint Responsibility	Other's Responsibility	If Joint or Other please identify them
	Municipality	Metropolitan Area			
Land-use	EHMOSV			MO	-Regional
Road building	EMS		HSV	EMO	-National -Regional
Public transport infrastructure	EO	S	HMOSV	E	-National -Regional Gov. - PT org.
Traffic management	EHMOSV		S	MO	-National -Regional -police
Bus and rail operation	HO	HOS	MV	EO	-Regional Auth. -PT operators
Information provision	EMOS	S	HMOV		-PT Regional Auth. -PT operators
Pricing	EHMOS	HS	MV	EHOS	-National Gov -PT Regional Auth.

Table 5 shows the areas of policy responsibility amongst our survey cities. It can be seen that in all our survey cities there is some division of responsibility across the different policy areas. Considering each policy area individually, significant proportions of the survey cities have exclusive responsibility for land-use (67%) or for traffic management (50%); and have joint responsibility for road building (69%), for public transport infrastructure (59%) or for information provision (54%). Almost half of the cities (48%) stated that public transport operations were not their responsibility, whilst a significant minority of cities (34%) stated that pricing measures were not their responsibility. However, when considering the policy areas together it is apparent that there is much diversity in the precise mix of responsibilities amongst our survey cities, making it difficult to identify any particular patterns. For example, despite the patterns of responsibility identified above, only 13% of cities have exclusive responsibility for land-use, exclusive responsibility for traffic management, joint responsibility for road building and joint responsibility for public transport infrastructure.

The pattern of responsibilities was very similar for different sizes of city. However, two thirds of the smaller cities manage their various responsibilities within a single department, where as almost two thirds of the medium-large cities do not. Across the whole range of cities, only 35% of cities manage their various responsibilities together.

Table 5 Responsibilities in survey cities (number of cities)

Measure	Your Responsibility	Joint Responsibility	Other's Responsibility
Land-use	36	17	1
Road building	9	37	8
Public transport infrastructure	14	32	8
Traffic management	27	23	4
Bus and rail operation	6	22	26
Information provision	13	29	12
Pricing *	11	22	18

* three cities did not respond

2.3.2 Influence of other authorities

Table 6 summarises core cities' comments on the influence on them of other authorities. Adjacent authorities and national government have the greatest influence, and the EU the least. The influence of regional authorities depends on the regional structure, as indicated above. Most cities commented that they expected the influence of the EU to increase, particularly through funding.

In practice influence will depend on the issue under consideration, and there will have been some subjectivity in respondents' assessments of the degree of influence of different authorities.

Table 6 Authorities and their influence in core cities.

(E = Edinburgh, H = Helsinki, M = Madrid, O = Oslo, S = Stockholm V = Vienna)

	Influence			
	Very much	Quite a lot	A little	Not at all
Adjacent authorities	O	EMS	HV	
Regional authorities		MS	HO	V *
National government	ES	HOV	M	
The EU		EV	MOS	H

* Edinburgh: Not appropriate now (Regional Councils abolished 1996 in Scotland)

Table 7 shows the level of influence on decisions in our survey cities from other levels of government. All of our survey cities consider that their decisions are influenced to some extent by other governmental authorities. However, significant minorities stated that adjacent, regional and national authorities influenced them only a little, whilst 50% of cities stated that they were influenced only a little by the EU. A further 36% of cities stated that the EU did not influence them at all. The strongest influence, judging by the number of cities stating that they were influenced very much, appears to come from adjacent authorities, though only 35% of cities stated this.

The pattern of responses for neighbouring authorities and the EU was very similar by city size, with around 50% of each group saying that they were influenced by neighbouring authorities, and only 10% to 15% saying that they were influenced by the EU. The influence of regional authorities was greater for smaller cities, with 75% of smaller cit-

ies saying that they were influences, as against 50% of larger cities. Conversely, the smallest cities were influenced least by national government; 30% of them were influenced very much or quite a lot, as compared with 70% of larger cities and 80% of medium cities.

Table 7 Authorities and their influence in survey cities (number of cities).

	Influence				
	Very much	Quite a lot	A little	Not at all	Not stated
Adjacent authorities	19	10	22	3	
Regional authorities	13	21	16	2	2
National government	14	19	18	3	
The EU	0	4	27	20	3

2.4 Planning horizons

Table 8 below presents a summary of the time-horizons in the core cities. The long-term planning horizon is generally considered to last up to 10-25 years, the medium-term planning horizon is from 5 up to 15 years. Short-term planning was considered for one year time period in most of the organisations. For some of the organisations, the length of the planning period was linked with the funding resources, which usually made the period shorter. Regarding the distinction between various types of time horizon, there seems to be less unified opinion of the significance of time period in decision making.

Table 8 Planning horizons in core cities.

City	Planning horizons				
	Short-term	Medium-term	Long-term	Update period	Scenario
Edinburgh	1-4	5	10-20	3-5	15
Helsinki	1	5	10-25	4-5	20-25
Madrid	1-3	4	10-20	4-8	20
Oslo	N.A.	4	10-20	4	12&15
Stockholm	1-3	10-15	20-30	4-10	15&30
Vienna	<5	5-12	10-20	5-10	20

Medium-term plans were generally considered more binding than long-term ones. In part this is because they are related to budgetary resources, and in part because they are subject to public hearings. Long-term plans are often subject to more consultation and review, particularly to reflect political changes. They are more likely to be used as guidelines for the city authorities rather than strict requirements on them.

Table 9 shows the planning horizons of our survey cities. It can be seen that the vast majority (80%) of cities have a medium term plan and that the time horizons for these ranged between 6 months and 10 years; most (77%) being between 4 and 10 years.

Over 60% of the survey cities have long term plans. The time horizons for most of these plans range between 10 and 20 years, though three are for less than 10 years and three

are for more than 20 years.

Disaggregating the responses by size, only 70% of medium sized cities have medium term plans, while over 85% of small and large cities do. More strikingly, while 80% of large cities have long term plans, under 60% of small and medium sized cities do.

Table 9 Planning horizons in survey cities (number of cities).

Years	Planning horizons	
	Medium-term	Long-term
4 or less	10	2
5-10	29	1
10-15		13
15-20		13
20-		3
No horizon specified	4	2
No plan	5	14
No response	6	6

2.5 Models and/or other planning methods

The municipal authorities are in the position, where they need relevant information on the effects of alternative scenarios planned and on different transportation or land-use policy options. Decision makers need to base their decisions on the best possible information available on the current and future state of the region, regarding economy, sustainability, absolute amount of traffic etc. The purpose of this section of the questionnaire was to find out how common the use of models is and how the results are made use of in the decision making.

It seems that the models are widely used in local and regional planning in large regional units, such as those subject to this study. The models can be classified into transportation models, strategic or tactical and land use models. All of the core cities have their own models of the transport system, in many cases they have land use models as well. The models are either operated by the cities themselves or consultancies or even both. In some cases the municipalities operate their own somewhat simple models and then the results are used as inputs in more complex or special-purpose models operated by the consultants. Although model results are used to inform decision-making, they are not used alone, expert judgement is also very important. The models used and their categories are given in Table 10. (Note: Some open modelling suites can be applied in both strategic and tactical planning.)

Table 10 Models used in the core cities

Model type/ City	Transportation		Land use
	Strategic	Tactical	
Helsinki		PKS-model+EMME/2, SATURN	MEPLAN
Oslo	Fredrik+EMME/2	Fredrik+EMME/2	PANDA
Edinburgh	START, SATURN	TRIPS	DELTA
Madrid	-	EMME/2	-
Stockholm	Fredrik, T-RIM , Sampers, SIMS (+EMME/2, VIPS)	Fredrik, T-RIM , Sampers, SIMS	IMREL, ISP
Vienna	VISUM/WISEM	VISUM/WISEM	

The models are considered as a good aid for the decision makers. In general, the models are considered objective by their nature. However, a reference was made that the user of the model must also remain objective so that the interpretation of the models is not influenced by the researcher. Regarding the outcomes of the policy simulations, there have been checks to verify the results by some of the interviewed organisations, but not on the frequent basis and with varying results. Thus, it is very difficult to arrive to exact conclusions regarding the degree of explanation and credibility of the models based on our data.

Half of the survey cities have their own models, though few stated what type of model they had, and most (59%) of cities used consultant's models. Interestingly, 26% of cities used both their own models and those of consultants, whilst approximately 20% did not use models at all.

2.6 Participation – persons involved officially/unofficially

Participation is an area in which practices differ greatly between countries. Some cities are required to consult with the public and business interests; some do so informally; few do so intensively (Flyvbjerg, 1998). Consultation can also take several forms, from comprehensive participation in decision-making to public inquiries into specific proposals. While there is a widely held view that the former is preferable, the latter is the norm in many cities.

Table 11 presents the core cities' assessments of the influence of different interest groups in determining land use and transport strategies. They differ widely, with business and commercial interests being thought to have very much influence in three of the cities, but only the media being assessed as having quite a lot of influence in all cities. The majority of the core cities considered that the public had rather limited influence.

Table 11 Influence of interest groups in the decision making in core cities.

(E = Edinburgh, H = Helsinki, M = Madrid, O = Oslo, S = Stockholm V = Vienna)

City	Very much	Quite a lot	A little	Not at all
Public	ES		HMO	
Media	ES	HMOV		
Associations	E	SO	HMV	
Commerce	EHO	SV	M	

Table 12 presents the assessments of the survey cities on the level of participation and degree of influence of five different interest groups. Three quarters of those responding involve business interest groups formally in decision-making; 60% do so for environmental and transport user groups and the general public. Conversely only 40% involve the media formally.

A substantial majority consider that business interests and the general public have a strong influence on decisions. Half consider that environmental groups and the media do, but only a third think that transport users have much influence.

Larger cities are more likely to involve business, environmental and transport user groups in decision-making, and less likely to involve the media; there were no differences for involvement of the public. The percentages for large cities were 60% for business, 55% for environmental and user groups, 50% for the public and only 10% for the media. For small and medium cities the comparable figures are 50%, 40%, 50% and 35%. Similar patterns were found for the influence of each of these groups, with the exceptions that smaller cities thought environmental and user groups had much less influence (at around 20%, compared with 45% for larger cities) and in all groups, around 35% thought that the media had a strong influence.

In addition to the stake-holder groups identified above, survey cities highlighted associations of local transport operators, health institutions, academic institutions and ethnic minority/disability/women's groups as being involved in and having an influence on decision-making in their city.

Table 12 Participation and influence of interest groups in survey cities (number of cities)

Interest group	Participation			Influence			No answer
	Formal	Informal	NS	Strong	Weak	NS	
Business Interest Groups	29	12	10	31	11	9	3
Environmental Pressure Groups	23	16	13	21	20	11	2
Transport User Pressure Groups	22	15	14	14	27	10	3
General Public	25	14	12	31	9	11	3
Media	13	21	17	21	22	8	3

2.7 Changes

Table 13 list the factors which core cities consider to have been the cause of the greatest changes in the decision-making process. Most identified changes in political structures and responsibilities as driving forces. Four mentioned economic and social changes, three the introduction of Environmental Impact Assessment, and one each legislation and new technology.

Not all cities responded to the question about changes expected in the next twenty years. The main differences concerned public participation, with some expecting it to increase, and others seeing it as having a diminishing role. Some mention was made of changes in technology.

Table 13 Major changes taking place in the core cities.

	Driving forces	Changes	
City		Political	Technical/regulatory
Helsinki	Education, information, economic and political reasons, public hearings		EIA
Oslo	Attitudes and awareness of the public, administrative districts		Legislation change to allow collecting new tolls
Edinburgh	Modernisation of Government	Restructuring of political DM-bodies	
Madrid	Political and economic factors	Increased cooperation in the planning process	New technologies facilitate coordination and information provision
Stockholm	Political and economic factors	Uncertainty of measures needed in the current situation	EIA
Vienna	Economic, political and social	Increased effectiveness in DM	EIA

All but seven of the survey cities identified major changes in the past. Twelve mentioned objectives which had become more important; for most this was the environment and sustainability, but two mentioned safety and one each equity, congestion relief, energy and quality. Five mentioned economic trends, predominantly growth. Seven mentioned the introduction of a new strategy at either local or national level. Twenty identified new policy measures being introduced; these were predominantly public transport and demand management, but five mentioned new roads. Eight referred to new land use policies, with all but one involving tighter controls and increased densities. Six mentioned improvements in government decision-making processes; most of these reflected significant changes in France and the UK. Four from Eastern Europe listed reductions in public ownership. Seven identified financial or public acceptability constraints. Apart from those mentioned, there were no obvious differences by type of city.

The same number predicted major changes which would influence future policy. Eight mentioned objectives which would become more important; again these were mainly environment and sustainability, but two mentioned quality and one energy. Five anticipated substantial urban growth. Two mentioned the introduction of a new local or national strategy. The majority (25 of the 47) listed policy measures which would become more important. Of these 18 were public transport improvements and 13 demand management, including three listing road pricing; five mentioned new roads. Ten anticipated greater control over land use, and increased density of development. Eight expected improvements in government decision-making structures, two reduced public ownership and involvement, and two greater public involvement.

3 Task 11: Objectives and indicators

3.1 Introduction

3.1.1 Background

In Work package 10 of PROSPECTS, one of the tasks has been to set out objectives for integrated transport and land use planning to achieve sustainable urban development, and to develop indicators of goal achievement. Based on local and national transport and land use plans from the Core Cities and their countries, as well as EU policy documents, an initial proposal for objectives along these lines was worked out. It was discussed in a series of interviews with city planners, politicians and interest groups from the six Core Cities. This chapter contains our final recommendations with regard to objectives and indicators.

Inevitably, the selection of objectives and indicators at such an early stage in the project must be based on a somewhat unclear view about the *scope* of urban land use and transport planning for sustainability. What is, and what is not going to be covered by our kind of planning? This question was not raised explicitly in the rounds of discussion. Implicitly, by defining the objectives that we have, we have excluded others, for example regarding the sustainability of the global patterns of production and trade of which the economic activity of the city is a part. Also, the exact definitions of the indicators still need further clarification in many instances.

3.1.2 Aim

The target we are aiming at with our planning is sustainable urban development. Some might argue that the history of city planning proves that plans are always wrong, never solve the problems they aim to solve and sometimes produce planning disasters, so the whole idea of planning should be abandoned. However, there is ample evidence that the problems of traffic congestion, accidents, badly functioning labour and housing markets, environmental degradation and social deprivation, overutilisation of resources such as energy and land, and the destruction of natural habitats and cultural heritage, will not be solved by markets alone.

Planning for sustainable urban development currently focuses on improvements in all of these characteristics of the functioning of cities. However, in PROSPECTS there has been a conscious decision to narrow down the scope of objectives to those that pertain to the transport and land use systems. We wanted to avoid objectives that are so broad or difficult to quantify that we cannot tell from an analysis whether they are fulfilled in a certain transport and land use plan or not. This leaves out important objectives especially with regard to quality of life and social issues, to the extent that they are not directly influenced by and measurable in the transport and land use system. The implication is that the issues left out are best dealt with by other forms of planning.

3.2 Sustainability, the basic objective

Even if the practical content of a sustainable urban development plan will have to be constantly revised in the light of new external pressures and new knowledge, there is a need for a fixed and clear conception of what (environmental) sustainability *is*. Without it, sustainability will only be a catchword.

Our definition of sustainability follows Chichilnisky (1996) and Heal (1998), see Minken (1999). According to them, one of the two defining characteristics of sustain-

ability as an objective is that it includes both the welfare of the present society and the society of the very distant future. The second defining characteristic of sustainability is that it implies conservation of natural resources. Put in other words: natural resources should be valued not only as something that may be consumed (in production or consumption), but also as stocks that benefit us even when not being consumed. The fundamental reason for this is that we are dependent on some basic qualities of our surrounding ecosystems for our quality of life and indeed to continue to exist. (See for example the Stadtentwicklungsplan 1994 of Vienna, pages 60-64).

If our strategies now had negligible long run effects, sustainability would not be an issue. The concerns about sustainability arises precisely because our actions now may constrain the opportunities of future generations and diminish their maximum attainable welfare. The aspects of our actions that are most likely to do so, are energy consumption, CO₂-emissions, emissions of other pollutants with long term or irreversible effects, and the running down of non-renewable resources like various kinds of green areas and cultural sites inherited from the past. Some forms of long term investments are also highly relevant. A fuller analysis of definitions is given in Appendix 2.

The PROSPECTS working definition of sustainable urban transport and land use reflects these considerations. Our definition is:

A sustainable urban transport and land use system

- *provides access to goods and services in an efficient way for all inhabitants of the urban area*
- *protects the environment, cultural heritage and ecosystems for the present generation, and*
- *does not endanger the opportunities of future generations to reach at least the same welfare level as those living now, including the welfare they derive from their natural environment and cultural heritage.*

While this definition was developed following our discussions with the core cities, it is largely accepted by them. Our survey cities were asked to consider how appropriate this definition of sustainability was to their circumstances. Whilst a relatively small proportion (24%) considered the definition to be ‘very appropriate’, the majority of cities (61%) considered the definition to be ‘quite appropriate’. Only two cities considered that the definition was ‘quite inappropriate’, the remainder either stating neutrality or no response. No alternative definitions of sustainability were offered by the survey cities. Therefore, whilst the survey suggests that there may be scope for identifying a definition of sustainability which is more appropriate to the circumstances of European cities, there was a good general degree of consent with our working definition.

Because sustainability involves trade-offs between generations, all sub-objectives listed in section 3.3, even if they are taken to apply only to the present generations, are legitimately sub-objectives of sustainability. Ideally, however, they should apply both to the present and to every future generation. If it is seen as impossible to predict and measure the level of sustainability at some distant point in the future, special emphasis must be attached to the sub-objectives whose current level will mean the most for the welfare of future generations. It is easily seen from our definition of sustainability which sub-objectives in the list below should be given a special emphasis when planning for sustainability.

Sustainability in the local transport sector is measurable by making certain modifications to an ordinary cost benefit analysis, see Minken (1999) and OPTIMA (1998). One of the challenges of PROSPECTS is to extend this indicator, the Sustainability Objective Function, to the wider field of land use and transport planning. At the same time, all the indicators of all the objectives listed below might also be utilised in measuring sustainability, provided due emphasis is put on the indicators that means the most to the welfare of future generations. These tasks belong to Work Package 20.

But our *strategies* are embedded in, and must be assessed on the background of local, national and international trends, which make up the *scenarios* that we plan for. Must we also assume of these trends that they are sustainable? Which strategy is the better, a strategy that performs well in a sustainable scenario, or a strategy that contributes little to sustainability in a sustainable scenario, but much to counteract the unsustainability of an unsustainable scenario? This is a difficult question to which we will have to come back in Work Package 20.

3.3 Sub-objectives to sustainability

While sustainability is considered the basic objective of urban land use – transport strategies, it can be achieved through a number of sub-objectives, all of which are of importance to cities. A list of six sub-objectives was developed in consultation with the Core Cities, covering:

- economic efficiency
- livable streets and neighbourhoods
- protection of the environment
- equity and social inclusion
- safety; and
- contribution to economic growth.

These are defined more fully below.

3.3.1 Economic efficiency

This is further specified to be economic efficiency in the transport markets, the housing market, the labour market, and possibly some composite commodity markets, as well as economic efficiency in infrastructure and housing provision.

This objective concerns the utility that the inhabitants of the city can get from taking part in these markets, and is measurable at the aggregate level as an appropriately specified welfare function, or at the level of each of the markets as consumer and producer surpluses. As for all the other sub-objectives, it may be an objective that is set for the present situation, or for some future situation, or both. The exact way to provide for future generations with respect to this sub-objective is to be decided in WP 20.

3.3.2 Livable streets and neighbourhoods

To us, this has the following aspects

1. Increased freedom of movement for vulnerable road users, including reduced risk of traffic accidents
2. Positive external effects of our transport and land use strategy on social, cultural and recreational activity in inner city and in neighbourhoods

This objective is focused on streets and outdoor conditions in residential areas. It is an important objective when planning for sustainability, and deserves to stand alone be-

cause it is neither captured in the economic efficiency objective, as we can measure it now, nor fully in environmental protection or safety objectives.

3.3.3 Protection of the environment

This sub-objective can be considered to involve a number of elements:

1. Reduce use of non-renewable resources and overutilisation of renewables.
2. Reduce energy use in transport, distribution systems and housing, and thereby reduce contribution to global climatic change (CO₂ emissions).
3. Reduce regional pollution by reducing emissions of NO_x and SO₂.
4. Reduce local damage and health problems caused by emissions of NMVOC and PM 10.
5. Protect cultural heritage sites, natural habitats, green areas, agricultural land and recreational areas.
6. Reduce urban sprawl and land-take for settlement and transport purposes.
7. Reduce the settlement and bio-diversity fragmentation by infrastructure.
8. Reduce activity with environmental consequences in areas with particular vulnerability.
9. Reduce the number of people exposed to noise, and reduce vibration from transport.

Objectives 2-8 may be seen as special cases of objective 1. As objectives, all of the nine fall in two groups: The ones that are included in the economic efficiency objective function (and have an indicator as a part of that) and the ones that must be measured by the level of goal achievement for some politically set goal (and will probably serve as constraints in optimisation).

Environmental effects may in turn have distributional effects. If we are able to identify the degree to which different areas are affected by negative environmental effects, it is a step towards identifying winners and losers with regard to environmental costs.

3.3.4 Equity and social inclusion

Social inclusion *in as far as our kind of planning is concerned about it*, consists of two sub-objectives:

1. accessibility for those without a car
2. accessibility for mobility impaired

Important as they are, policies to provide affordable housing to everybody, to secure minimum levels of consumption, schooling etc. for everybody, and to counteract racism and other forms of social exclusion, are seen as lying outside the scope of the project and the kind of planning to be addressed in the guidebooks.

Equity, on the other hand, consists of

3. "fair shares/level playing field" – each mode and operator should neither pay way more nor way less than it gets from the government
4. "compensation to losers" – inequitable effects of our strategies should be counteracted as far as possible
5. "economise on tax payers' money" - funds used for transport and land development purposes have alternative uses

The reason why the last objective is grouped under equity, is that public funds could be used instead for schooling, health care etc., which would have obvious equity implications. As far as this is the case, and only as far as this is the case, we also include the wider aspects of social inclusion and equity in our objectives.

The sub-objective of compensation to losers includes compensation to those who are affected by negative impacts on the environment and safety.

3.3.5 Safety and severity of traffic accidents

As with environmental sub-objectives, there is also a distributional perspective associated with traffic accidents. This ought to be reflected by our indicator list.

3.3.6 Contribution to economic growth

It will be an important objective for most cities that land use and transport policies should support economic growth. The SACTRA Report on "Transport and the Economy" (SACTRA 1999) identifies mechanisms by which transport improvements theoretically might lead to increased economic activity and thereby possibly to sustained economic growth. However, the empirical identification of such effects is a field of research that is poorly developed, and evidence is limited. Thus it might be difficult to measure goal achievement with respect to this objective.

Any city is part of wider systems - perhaps world wide systems - of production and trade. Whether these systems are sustainable is an important question that cannot be fully addressed in our project. We will have to make assumptions about it when we develop scenarios in task 12. These assumptions imply a certain city specific growth rate that may be influenced by urban transport and land use strategies, but probably for the most part only in a minor way.

Table 14 summarises the core cities' views on the importance of these six objectives. All thought economic growth and economic efficiency important or very important. Some thought environmental protection and safety only quite important. The lowest assessments were given to equity and livable streets, which some considered unimportant.

Table 14 Importance of objectives to core cities

(E = Edinburgh, H = Helsinki, M = Madrid, O = Oslo, S = Stockholm V = Vienna)

	Very important	Important	Quite important	Not at all important
Economic efficiency	MOSV	EH		
Livable streets		EOSV		HM
Environmental protection	S	EHO	MV	
Equity	E	S	HOV	M
Safety	ES	HOV	M	
Economic growth	HMOSV	E		

Table 15 summarises the assessment of the importance of these sub-objectives to our survey cities. In all cases over 90% of respondents considered these sub-objectives of some importance. Economic growth received the highest scores, followed by safety and economic efficiency; livable streets and the environment received slightly lower scores. The equity sub-objective received the lowest assessment, with only 70% considering it

important or very important. There were very few differences by city size; the only ones of note were that economic growth was slightly less important for medium sized cities, and liveable streets was of most importance to the smaller cities.

Table 15 Importance of sub-objectives to survey cities (number of cities)

	Very important	Important	Quite important	Not at all important	NS
Economic efficiency	25	20	8	0	1
Liveable streets	20	26	5	1	2
Environmental protection	20	23	8	2	1
Equity	18	20	11	2	3
Safety	25	22	5	1	1
Economic growth	28	22	3	0	1

3.4 Indicators

3.4.1 What indicators do we need?

The indicators that we need, are indicators of *impacts* or end results of the strategies that we test. We need them to evaluate future transport and land use strategies. Indicators of how the processes that lead to these end results develop in the real world will be useful to construct the planning tools that we need, but they do not concern us here.

Indicators for use in planning, and especially for use in optimisation, must fulfil other requirements than indicators used to monitor actual progress. First, we are interested in an *exhaustive* set of indicators. If our objectives and indicators do not exhaust the whole range of impacts that people care about, we are bound to get into problems. The level of goal achievement with regard to *identified* objectives may be fine, but at the same time unwanted effects may occur that we neither have monitored through indicators, nor identified as an objective to avoid. Second, we should avoid double-counting. Consequently, the indicators that we propose to use in PROSPECTS are as far as possible directly related to the sub-objectives set out in the previous section, in such a way that each sub-objective gets its own indicator or set of indicators.

As we are not monitoring a system as it evolves in the real world, but are engaged in planning for the future, only data that can be derived from the planning process itself can be used to construct the indicators. Another concern is with analytical soundness. There must be a clear link between the impact/level of goal achievement and the indicator. Finally, our indicators should be sensitive to changes in the strategies that we test.

Indicators are proposed at three levels. Level 1 indicators are comprehensive measures of all aspects of a sub-objective. For instance, cost benefit analysis (CBA) produces a comprehensive measure of economic efficiency, where the impacts are not only quantified, but also valued. The concern about level 1 indicators is not only if data is available, but also if a sound analytical method has been used for valuing or weighting the impacts. Level 2 indicators are quantifiable measures of aspects relating to the achievement of a sub-objective. The main concern is with data availability. Level 3 indicators are qualitative assessments of the level of goal achievement. However, in some instances the adoption of a policy will immediately imply that a certain sub-objective is achieved. For instance, if it is decided not to build down green areas, a sub-objective

regarding green areas may be considered as reached. Such decisions are also used as level 3 indicators.

We develop indicators for the lower levels to supplement the level 1 indicators, or substitute for the lack of level 1 indicators.

3.4.2 The list of indicators

The following Table 16 is a simplified version of the full list of indicators, found in the task 11 report.

Table 16 List of indicators

Sub-objective	Level 1	Level 2	Level 3
Economic efficiency	Cost-benefit analysis	Time and money costs	
Liveable streets and neighbourhoods		Accidents by location, mode, victim	Feeling of freedom of movement, danger
Protection of the environment	Environmental costs	Energy and land use, emissions	
Equity and social inclusion	Accessibility for those without a car, mobility impaired	Losers and winners by category	
Reduce traffic accidents	Accident costs	Accidents by location, mode, victim	
Support economic growth	Changes in local GDP		

The structured approach to defining types of indicators was welcomed by our core cities. Table 17 indicates that the majority use all three types of indicator. However, all cities were concerned about the problems of precise definition of many of the indicators, and of obtaining the relevant data.

Table 17 Core city comments on the use of indicators

(E = Edinburgh, H = Helsinki, M = Madrid, O = Oslo, S = Stockholm V = Vienna)

	No	Yes
Quantified, with money values	V	EHMOS
Quantified, without money values		EHMOSV
Qualitative	M	EHOSV

Our survey found that most (81%), though not all, cities use indicators of some type, be they quantified in monetary terms, quantified in non-monetary terms or qualitative. Only 35% of cities use indicators which are quantified in monetary values, whilst 57% use indicators which are quantified in non-monetary terms and 72% use qualitative indicators. Just over 25% of cities use all three types of indicator.

Table 18 Use of indicators by survey cities (number of cities)

	No	Yes	Not stated
Quantified, with money values	27	19	8
Quantified, without money values	15	31	8
Qualitative	7	39	8

3.4.3 Further development of indicators

There is still some work to do to define the indicators of each of the sub-objectives in a precise and operational way. This work is going on. As an example, the indicators of the sub-objectives of equity and social inclusion are treated here.

The sub-objectives under this heading are:

1. accessibility for those without a car
2. accessibility for mobility impaired
3. "fair shares/level playing field" – each mode and operator should neither pay way more nor way less than it gets from the government
4. "compensation to losers" – inequitable effects of our strategies should be counteracted as far as possible
5. "economise on tax payers' money" - funds used for transport an land development purposes have alternative uses

Indicator with respect to sub-objective 1, accessibility to those without a car

We assume the model can identify (define) the group without a car, and that the consumer surplus of this group can be derived from model output. The relevant indicator is consumer surplus per capita for those without a car as a proportion of overall consumer surplus per capita.

Indicator with respect to sub-objective 2, accessibility to mobility impaired

Here, unless we are prepared to build a transport model for this group (I assume we will not), the indicator must be based on a verbal description of the special services open to such travellers, plus any physical or information measures that could make it easier for this group to use ordinary public transport. The overall assessment of this level of service is a qualitative indicator (level 3 indicator).

Indicators with respect to sub-objective 3, level playing field

The indicators can be public investment plus the net present value of subsidies minus the net present value of taxes paid for the different modes and sectors. Indicators will be calculable from the model output.

We will not want to use this indicator unless cities think this sub-objective is important to them. (If this sub-objective is included into the objective function and pushed to the limit, it becomes very much like the DOF of FATIMA (Minken, 1998)).

Indicators with respect to sub-objective 4, compensation to losers

Obviously, we cannot identify losers at a very detailed level. We will have to address the question of "who wins, who loses" at the level of broad social groups.

Income groups: The population is ordered by (after tax) household income in 4-10 income groups. (Note that personal income is not used for our equity analysis. Experience from AFFORD (Fridstrøm et al., 2000) suggests that this will make the lowest income group consist of a relatively large share of people with a high income travel behaviour, access to cars etc. Obviously these people are better off than their personal income would suggest).

Household types: The most relevant distinctions according to political debate about road pricing etc. are between singles and couples and between households with and without children. This gives us four types: Single person household without children, single person households without children, many person households without children and many person households with children. The definition of "child" may be persons whose travels are not included in the transport model. (Below 16 or below 13?).

Households by location: Model zones or aggregates of model zones are used.

Age and other characteristics are ignored for the purpose of equity analysis.

Basically, the indicators will be consumer surplus plus compensation per capita for each of these groups. Consumer surplus is calculated by the model. Any compensatory payment is calculated separately, depending on the compensating measure and the mean tax rate of the group involved.

For the analysis of income group inequality, the *Gini coefficient* provides an overall indicator.

Indicators with respect to sub-objective 5, taxpayers' money

The indicator is the *net present value of finance*. It is calculated from model output.

It is clear that much further work is needed on the development of appropriate indicators, and this will be pursued further in Work Package 20.

4 Task 12: Trends and Scenarios

4.1 Introduction

Planning can be defined as a formalised procedure to produce an articulated result in the form of an integrated system of decisions (Höjer, M., 2000). It is in this context that one needs to define a scenario. Scenarios can be defined as projective and prospective (see Becker et al., 1982, Van der Heijden, 1996, Makridakis et al., 1998). In another word scenario is defined as either the future development or a future state. Projective scenario's starting point is the current situation; extrapolation current trends results in future images. Prospective scenarios starting point is a possible or desirable future situation, usually described by a set of goals or targets; established by assumed events between the current and future situation. The context for a scenario refers to general "macro developments", e.g. assumptions about economic development, demography, the stability of the supply of fossil fuels, prices of fossil fuels, international relationships, assumed behavioural changes, etc (Geurs and Ramjerdi, 1997).

Objectives of a study should determine the distinctions between exogenous and endogenous variable. Endogenous variables are in fact the different indicators by means of which we can evaluate the achievements of the objectives.

It is important to point out that the exogenous variables in a scenario are not totally independent of each other. An example is the change in employment and economic development or changes in car ownership and economic development This is why a future scenario, composed of these variables, has to present a coherent picture of that future. Further more, it is not always a very simple task to draw a clear line between an exogenous and an endogenous variable. An example is economic development, which is usually included as an exogenous variable in a scenario, while economic development is usually an important indicator or objective

Uncertainties associated with the development of the exogenous variables will create uncertainty about the state of the future. It is commonly known and empirical evidence suggests that a simple averaging of predictions improves forecasting accuracy and reduces uncertainty (S. G. Makridakis, 1990). Addressing uncertainties about future states can be addressed by a scenario study. The level of uncertainties depends on time scale. Generally, the longer the horizon, the higher the level of uncertainty. A scenario study should address a minimum number of scenarios in order to cover the range of uncertainties in future developments and related to the objectives.

The aims of this task are to review past trends in policy performance, and future generic and local scenarios that provide the context within which the policies will need to develop. The efforts lead to the alternative scenarios to be used in later workpackages. We aim to produce both specific scenarios for each city and generic ones for the EU, which reflect trends in EU policy, economic developments, urbanisation, demographic changes, competition and regulation and technological changes. The objective has been to answer the following questions:

- What have been the most important trends in exogenous variables in the context of the urban (land use) and transportation systems performances?
- What are the most important exogenous variables to be included in a future scenario?
- How are uncertainties related to future trends of exogenous variables are dealt with?
- What time scale(s) should scenarios cover?

- How to formulate a set of necessary (minimum number of) scenarios for future in order to address these uncertainties?
- What are the objectives of scenario analysis?

4.2 Trends

The aim has been the identification of the most important trends in exogenous variables in the context of the urban (land use) and transportation systems performances. With the acknowledgement that the past trends in these variables have not been independent of each other, the following trends have been identified by different cities as important in influencing the performance of their urban and transportation systems.

Table 19 lists the trend variables which the Core Cities identified as the most important in influencing current conditions, and the rank orders which they gave.

Table 19. Rankings of the important trends by the Core Cities (Rank 1= most important)

City/Rank	Vienna	Oslo	Edinbu rgh	Madrid	Helsin ki	Stockh olm
Population growth	10	2	5	1	1	1
Age structure of population	8					2
Household structure	7					
Economic growth		3	1	2	3	3
Changes in job/employment structure	9	4				4
Changes in total employment		1			2	
Division of labour, specialisation	2					
Restructuring businesses and changes in work arrangement			4			
Car ownership			2	3	5	5
Changes in relative prices	3		6			
Changes in surface coverage of the city	5				4	
Changes in population density	6					
Decentralisation/urban sprawl	1			4		
Changes in work location	4			5		6
Changes in home location				6		
Changes in land use			9			
Changes in tourism and leisure activities			8			
Retail changes			3			
Changes in city image			7			
Changes in national policies		5				

Table 19 shows that the following ten variables have been identified by two or more Core Cities; the numbers identifying them are shown in brackets:

- 1 Population growth (6)
- 2 Economic growth (5)
- 3 Changes in car ownership (4)
- 4 Changes in job/employment structure (3)
- 5 Changes in employment location (3)
- 6 Age structure of population (2)
- 7 Changes in total employment (2)
- 8 Changes in relative prices (2)
- 9 Changes in surface coverage of the city (2)
- 10 Decentralisation/urban sprawl (2)

It should be noted that these variables are not wholly independent of one another; for example, employment will be correlated with economic and population growth. Some trends identified by the project team as of potential importance were not specified by the Core Cities. These were changes in female participation in the workforce; changes in fuel efficiencies; and development of intelligent transport systems.

Survey cities' views were sought on the importance of the top five from the above list, and their responses are given in Table 20. In general, there appears to be a good level of agreement between our core cities and the survey cities. It shows that 80% of cities feel that employment location has been important (or very important) to them, whilst population growth, economic growth and car ownership have been important to approximately 70% of cities and employment structure has been important to 44%. In addition, survey cities have suggested a number of other variables which have been important in their city, including location of schools, urban and social structures and the development of environmental legislation. Smaller cities place more emphasis on population growth, less on employment location, and much less on employment structure than do medium and larger cities; medium cities place less importance on employment growth and car ownership than do small and large cities.

Table 20 Importance of principal trends for survey cities (number of cities)

	Very important	Important	Quite important	Not at all important	Not stated
Population growth	23	14	11	4	2
Economic growth	13	24	11	5	1
car ownership	23	15	12	3	1
Employment structure	10	14	24	5	1
Employment location	15	26	10	1	2

4.3 Scenarios

The aim has been the identification of the most important exogenous variables to be addressed in a future scenario. As in trends, it should be acknowledged that the developments in the exogenous variables are not independent of each other, which demands attention when constructing a scenario. Table 21 shows the summary of the rankings of the most important variables that should be included in a scenario by the Core Cities.

Table 21 Rankings of important variables for inclusion in a scenarios (Numbers in the table refer to the rankings of the variables by the Core Cities. Rank 1 = most important)

Variable	Vienna	Madrid	Edinbur gh	Oslo	Stockh olm	Helsin ki
Population growth	10	1		2	2	2
Age structure of the population	8			3	7	
Household structure	7					
Economic growth		2		1	1	3
Changes in job/employment structure	9				6	
Changes in car ownership		3		*		5
Changes in relative prices	3					6
Changes in the surface coverage of city	5					4
Changes in population density	6					
Changes in urban sprawl	1	4				
Changes in work locations	4	5			4	
Changes in home locations		6			5	
Division of labour/specialisation	2					
Organisational changes				4		
Changes in employment					3	1
Attitudes and appreciation						7

* For Oslo, changes in car ownership is not among the ranked variables although planners consider this variable very important, but they felt that it is included in the economic growth variable.

Table 21 shows that the following seven variable have been identified by two or more Core Cities as important contributors to scenarios; the numbers mentioning them are shown in brackets:

- 1 Population growth (4)
- 2 Economic growth (4)
- 3 Changes in work location (3)
- 4 Changes in car ownership (2)
- 5 Changes in surface coverage of city (2)
- 6 Changes in urban sprawl (2)
- 7 Changes in employment (2)

Some variables identified by the project team were not specified by the Core Cities; in particular changes in technology and in fuel efficiency. Others were mentioned, but not considered important; in particular changes in relative prices and in the age structure of the population.

Survey cities' views were sought on the importance of the first five in the list above, and their responses are given in Table 22. In general, there is again a good level of agreement between our Core Cities and the Survey Cities, with over 80% identifying economic growth and changes in employment location as important or very important, and 70% population growth and size of the urban area. The lowest score was for car ownership, which only 60% considered important. Smaller cities placed less emphasis on employment and car ownership than medium and large cities. Medium cities place greater emphasis on population growth, and large cities greater emphasis on economic growth. There were few differences in emphasis on size of the urban area.

Table 22 Importance of principal scenario variables to survey cities (number of cities)

	Very important	Important	Quite important	Not at all important	NS
Population growth	22	15	13	2	2
Economic growth	23	23	6	0	2
Employment location	26	18	8	1	1
Car ownership	19	14	16	4	1
Size of urban area	26	13	9	4	2

4.4 Uncertainties associated with exogenous variables

The short run and long run levels of uncertainties associated with the variables that are identified as the most important variables for the construction of a scenario by the Core Cities are presented in Table 23. It should be pointed out that the respondents in Stockholm did not agree on the level of uncertainties associated with a variable all the time.

As the results in Table 23 suggest, it is not possible to conclude on the level of uncertainties associated with an exogenous variable, except that the respondents assert a higher level of uncertainty on the development of exogenous variables in the long run than in the short run. Economic development is the variable that has highest associated level uncertainties in short and long run. Other variables with high level of uncertainties are changes in work location and total employment.

Table 23 Short and long run level of uncertainty associated with the an exogenous variable by Core City

(E = Edinburgh, H = Helsinki, M = Madrid, O = Oslo, S = Stockholm V = Vienna)

Variable	Short run uncertainty			Long run uncertainty		
	High	Medium	Low	High	Medium	Low
Population growth		O	HMSV		HMOSV	
Economic growth	HS	M	O	HMS	O	S
Change in work location		MV	O	MOV		
Change in home location			MO		MO	
Surface coverage of city			HOV		HOV	
Urban sprawl		O	HMS		HMOS	
Total employment		H	O	H	O	

4.5 Scenario planning

Table 24 indicates that all six of the Core Cities specified scenarios in their future planning, although in practice Oslo and Madrid only used a single scenario. In all cases the scenarios can be made available for the project.

Table 24 Use, number and availability of scenarios among Core Cities

City	Are scenarios specified	No. of scenarios	Accessible
Helsinki	Yes	3	Yes
Oslo	Yes	1	Yes
Edinburgh	Yes	3	Yes
Madrid	Yes	1	Yes
Stockholm	Yes	2	Yes
Vienna	Yes	3	Yes

Core Cities use scenarios to help address the uncertainties in planning land use and transport strategies. However, they appear not to have clear views on the number of scenarios required, or on their use for identifying future problems, generating strategy options, or testing their robustness. This is an area in which further advice could usefully be developed. Appendix 3 provides some further guidance on potential common scenarios.

It has been recognised by the Core Cities that the formulation of a set of future scenarios should allow for the uncertainties in the most important exogenous variables, by combination of these in a coherent picture (scenario) in such a way to produce a minimum number of scenarios.

5 Task 13: Policy Options

5.1 Introduction

5.1.1 Background

A policy measure may be defined as an instrument or tool which policy-makers and planners can use in order to further an overall policy. Whether they follow a plan-led, vision-led or consensus-led approach to decision-making, policy-makers and planners have a large number of policy measures available to them to assist in the pursuit of their overall transport and land-use policy. This can be advantageous in that it provides a high degree of choice and flexibility, although the sheer scale of choice and flexibility might be viewed as overwhelming.

In practice, a number of policy measures may be quickly disregarded by cities on the grounds that they are inappropriate to their circumstances. In addition, many cities may have given a great deal of consideration to their transport and land-use policy and will, therefore, have a clear idea of which subset of policy measures are of most importance to their circumstances. Therefore, cities will rarely view themselves as requiring to consider the full range of policy measures available to them. However, as circumstances change over time, it may be necessary for cities to consider policy measures which they had previously disregarded or to disregard policy measures which were previously important to them.

This chapter draws together the comments from the core cities and the responses from the wider city survey with regard to policy measures. Following this introduction, section 5.2 provides a listing and categorisation of policy measures available to cities, with summary comments arising from the interviews and questionnaire responses. Section 5.3 then discusses the policy priorities identified by the different cities. Section 5.4 then provides discussion of policy packaging, again with summary comments arising out of the city interviews and questionnaire responses.

5.1.2 Aim

The aim of this task has been to identify the full range of policy measures which may need to be addressed in developing sustainable strategies. In the course of the work we also sought to highlight the priorities amongst the range of policy measures and to clarify the role of 'policy packaging'.

5.2 The Full Range of Policy Measures

5.2.1 Introduction

The starting point for this task was a survey of policy measures which had been conducted by the Institute for Transport Studies at Leeds for the UK Department of the Environment, Transport and the Regions (May and Still, 2000). That survey had been carried out for a different purpose: guidance for a series of multi-modal studies in interurban corridors. However, it provided the most up to date list of potential land use and transport policy measures, and was thus used as a basis for initial approaches to the Core Cities. It identified some 60 policy measures, and categorised them into five groups:

1. land use measures;
2. infrastructure provision;
3. management of the infrastructure;
4. information provision; and
5. pricing.

As a result of our consultation with the Core Cities, we were able to expand the list to some 80 types of policy measure which are available to cities. These included measures outside the transport field which might help compensate users for any unfairness in the distribution of travel costs. We found it helpful to categorise them under the seven broad headings, detailed as sections 5.2.2-5.2.8. Space precludes a detailed description of each, but brief explanations are given for those which might be less clear. May and Still, 2000 provide fuller descriptions, and a brief assessment of performance, for those which were on the original list. Deliverable 4, which is scheduled for August 2001, will update this to cover the full range of measures listed.

For the purposes of implementation and/or modelling, it would be necessary to specify each of the policy measures in greater detail. For example, there are a number of different forms of urban road pricing and each one could be implemented at different pricing levels, for different time periods and in different areas. These issues will be addressed further in Work Packages 30 and 40.

5.2.2 Land use measures

- Development densities, involving an increase in density of development throughout an area to reduce the need to travel;
- Development pattern, including transport corridor-based developments designed to encourage provision and use of public transport;
- Development mix in which homes, jobs and shops are placed close together, thus reducing the need to travel;
- Protection of certain sites from development;
- Parking standards for new development;
- Commuted payments, whereby developers can provide less parking, but pay for public space;
- Developer contributions to the financing of infrastructure;
- Value capture taxes, designed to reflect the windfall benefits to existing developments from improved accessibility; and
- Other land-use taxes, including property taxes.

5.2.3 Attitudinal and behavioural measures

- Public awareness campaigns, designed to encourage individuals to use alternatives which reduce overall travel, and travel by car;
- Flexible working hours;
- Telecommunications as an alternative to travel; and
- Company travel plans, in which firms set out ways in which they can reduce their demands on the transport system.

5.2.4 Infrastructure measures

Measures to influence car use

- New road construction; and
- New off-street parking.

Measures to influence public transport use

- Upgrades to existing fixed infrastructure;
- Reopening closed rail lines;
- New rail stations;
- New rail lines;
- New rail services on existing lines;
- Light rail systems;
- Guided bus systems;
- Park and ride;
- Terminals and interchanges; and
- Enhancement of bus and rail vehicles.

Provision for cyclists and pedestrians

- Cycle routes;
- Pedestrian routes; and
- Pedestrian areas.

Provision for freight

- Lorry parks; and
- Transhipment facilities.

5.2.5 Management of the infrastructure

Measures to influence car use

- Road maintenance;
- Conventional traffic management;
- Conventional speed controls and restrictions;
- Urban traffic control systems;
- Intelligent transport systems, which use new technology to improve the performance of the road network;
- Accident remedial measures;
- Traffic calming measures;
- Physical restrictions;
- Regulatory restrictions;
- Parking controls, including controls on duration, entry times and designated users; and
- Car sharing.

Measures to influence public transport use

- Maintenance of existing fixed infrastructure;
- New bus services;
- Bus priorities;
- High occupancy vehicle lanes;
- Changes in bus and rail frequencies;

- Timetabling strategies, such as regular “clock-face” departure times and simple (eg 10 minute headways);
- Bus service management measures designed to improve reliability; and
- On-bus cameras for traffic regulation enforcement.

Provision for cyclists and pedestrians

- Cycle lanes and priorities;
- Cycle parking provision;
- Pedestrian crossing facilities; and
- Safe routes to school, including innovations such as “walking bus services” in which children walk together.

Provision for freight

- Lorry routes and bans; and
- Lorry parking and loading restrictions.

5.2.6 Information provision

Measures to influence car use

- Conventional direction signing;
- Variable message signs;
- Real-time driver information systems and route guidance; and
- Parking guidance and information systems.

Measures to influence public transport use

- Conventional timetable and other service information;
- Real time passenger information;
- Trip planning systems which provide information on alternatives before the start of the journey; and
- Operation information systems such as bus fleet management.

Provisions for cyclists and pedestrians

- Static direction signs; and
- Tactile footways.

Provision for freight

- Static direction signs; and
- Fleet management systems.

5.2.7 Pricing

Measures to influence car use

- Parking charges;
- Charges for ownership of private parking space;
- Urban road charging, including area licensing and road pricing;
- Vehicle ownership taxes; and
- Fuel taxes.

Measures to influence public transport use

- Fare levels;
- Fares structures, such as flat fares, zonal fares and monthly passes;
- Integrated ticketing systems; and
- Concessionary fares, which are lower for identified groups of users such as elderly people.

5.2.8 Compensatory measures outside the transport field

- Changes in local taxes;
- Changes in business taxes;
- General subsidies for specific groups; and
- Targeted assistance for specific groups, such as payment for double-glazing where there are noise impacts.

5.3 Priorities among policy measures

5.3.1 Most popular policy measures

The Core Cities were asked which of the measures listed above they considered to be the most important in developing their strategies. Cities differed in the numbers which they quoted, and there was a tendency for respondents to focus on the types of measure with which they were most familiar, and with measures which could readily be implemented. Some respondents commented that some of the measures listed had a more strategic role, while others were more local in their impact. The latter included measures for pedestrians, cyclists and freight, as well as several management measures.

Table 25 summarises their responses, solely for the measures identified by at least one city. Given the nature of the discussions, these results are of limited value, but they do show a greater emphasis on development patterns; public awareness campaigns; new rail lines; parking controls; public transport service levels; parking charges; urban road charging; and public transport fare levels. These formed the basis for the question on policy measures to the Survey Cities, who were asked how important each of these, and one or two other measures selected to represent the groups in section 5.2, were.

Table 25 Core cities most important measures.

(E = Edinburgh, H = Helsinki, M = Madrid, O = Oslo, S = Stockholm V = Vienna)

POLICY MEASURES	E	H	M	O	S	V
Development densities	*					*
Development pattern	*	*	*	*	*	*
Development mix	*	*				
Development contributions				*		
Public awareness campaigns	*	*				*
Flexible working hours		*		*		
Company travel plans						*
New road construction				*	*	
New rail stations				*		
New rail lines		*	*	*	*	
New rail services						*
Park and ride			*			
Terminals and interchanges			*	*		
Cycle routes		*				
Intelligent transport systems			*	*	*	
Regulatory restrictions				*		
Parking control			*	*		*
Car sharing			*			
Bus priorities	*	*				*
High occupancy vehicle lanes			*			
Public transport frequency	*	*	*	*	*	
Cycle lanes and priorities		*			*	
Conventional timetable						*
Real-time passenger information		*				*
Parking charges	*	*		*	*	*
Charges for private parking		*				*
Urban road charging	*	*		*	*	
Fuel taxes				*	*	
Public transport fare levels		*	*	*	*	

Table 26 shows the survey cities' assessment of the importance of the 10 policy measures identified by our core cities as being most important to them. In general there is a good level of agreement between our core cities and the survey cities as to what policy measures are important. Over 80% identify bus priorities and bus and rail frequencies as important or very important, and for most of the remainder at least 60% do. However, only 30% consider road pricing important, and only 20% flexible working hours. Smaller cities placed less emphasis on awareness campaigns, rail provision, bus priorities and real time information than did medium and larger cities. Medium cities placed greater emphasis on parking charges but less on road pricing. Larger cities were less concerned with development patterns and with fares. In addition, the survey cities identified a number of other policy measures which they believed to be important, including park and ride, supplementary housing construction, mobility management and pedestrianisation.

Table 26 Importance of different measures in survey cities (number of cities).

Policy Measure	Very important	Important	Quite important	Not important	N/S
Development	21	19	10	3	1
Awareness	9	23	16	5	1
Flexible hours	0	11	27	15	1
Rail infrastructure	15	17	7	13	2
Bus priorities	23	23	8	0	0
Service frequencies	26	20	6	1	1
Real time info	8	28	15	3	0
Parking charges	17	27	7	2	1
Road Pricing	6	10	14	19	5
Bus/Rail fare Levels	12	22	11	6	3

One application of these results will be in the selection of policy measures to be tested in Work Packages 20 and 30, which assess the potential of evaluation and modelling tools.

5.3.2 Least popular policy measures

Core Cities were also asked to identify those measures which they were less likely to use. Their responses on this were less informative; some identified measures which required new legislation, and other measures which were less likely to attract public acceptance. It was concluded that these issues were best dealt with in the consideration of barriers (Section 6).

5.4 Packages of policy measures

There has been growing interest in the last decade in integrated transport and land use strategies, in which combinations, or packages, of measures are used to achieve a higher standard of performance against the policy objectives. The literature suggests that there are at least three reasons for combining measures into packages in this way:

- to achieve complementarity between measures;
- to generate additional finance to support the overall strategy; and
- to increase the acceptability of the overall strategy (May and Roberts, 1995).

All of our Core Cities accepted that they could not tackle their transport problems by using one or two of these measures alone, and that they needed to use them in combination. The combinations which they used, and the reasons for them, however, differed considerably from one city to another. The key reasons for combining measures are:

- to reinforce the effect of a measure;
- to offset its adverse effects;
- to compensate losers;
- to increase public acceptability; and
- to generate revenue.

There may be benefits in terms of the delivery or implementation of policy, i.e. mixing policy measures which have short term expected impacts with those which have longer term expected impacts may help to demonstrate to the public that change is taking place and may help to foster an acceptance of change.

The reinforcement of other policy measures could be outside of transport and land-use in the strict sense. For example, transport measures could be packaged with urban design measures and, together, these could have positive economic development impacts.

Table 27 shows the way in which our core cities combine the key policy measures, as identified above. It can be seen that many of the cities use these policy measures in combination with one another and with other complementary measures. The measures identified appear to complement one another in two ways. Firstly, measures often tend to be combined by mode, eg bus priority with bus frequency and with real-time information, so that several mode-specific enhancements build upon one another. Secondly, measures are combined such that one acts as a ‘carrot’ and the other a ‘stick’, eg combining parking charges with public transport improvements.

Table 27 Measures which are packaged with others by Core Cities.

(E = Edinburgh, H = Helsinki, M = Madrid, O = Oslo, S = Stockholm V = Vienna)

Policy Measure	Yes	No	If so, which
Development	EHMOS	V	New PT lines, activity location
Awareness	EV	M	Bus priorities, service frequencies, parking charges
Flexible hours		EMV	
Rail infrastructure	EHMOS	V	Level of service improvement
Bus priorities	EMV		Bus/rail frequency, comfort improvement, awareness, service frequencies, parking charges
Service frequencies	EMSV		Real time info, awareness, bus priorities, parking charges
Real time info	EM	V	Priority
Parking charges	HMOS V	E	PT improvement, awareness, bus priorities, service frequencies
Road pricing	ES	V	Infrastructure investments, public transport fare levels
Bus/Rail fare levels	HS	EV	Road users charges, parking charges

Having obtained our Core Cities’ experience on packaging of measures, we then asked our Survey Cities for their experience. In an attempt to make the answers more concrete, we took the list of priority measures in Table 26 and asked respondents whether they implemented them alone or in combination with other measures, and if so which they combined them with.

This question was not answered well, with up to 40% not providing answers for specific measures. Of those which did, the majority stated that they did combine at least some of the identified measures with others. The most commonly combined policy measures were development patterns, bus priorities, parking charges and bus and rail frequencies; with over 70% of those responding stating that they combined them with other measures.

Table 28 Measures which are packaged with others by survey cities (number of cities).

Policy Measure	Yes	No	Not stated
Development	33	5	16
Awareness	18	16	20
Flexible hours	10	24	20
Rail infrastructure	17	17	20
Bus priorities	29	9	16
Service frequencies	27	10	17
Real time info	19	18	17
Parking charges	28	10	16
Road Pricing	9	24	21
Bus/Rail fare Levels	14	19	21

6 Task 15: Identification of Barriers

6.1 Introduction

6.1.1 Background

As indicated in Figure 1, the policy measures from Section 5, alone or as integrated packages, can form the basis for possible strategies. However, there will be a number of barriers to the implementation of specific measures and overall strategies. These are discussed in the section.

6.1.2 Concept and types of barriers

A barrier is an obstacle that prevents the coming-into-force of a particular measure, or causes delays in its implementation. Barriers can be rigid or flexible, the latter being able to be overcome given sufficient time or resources. Land use measures tend to face more rigid barriers than, say, management or information measures.

Barriers can be either positive or negative. A positive barrier arises when one of the objectives of the strategy restricts the ability of a measure to achieve other objectives. Environmental constraints are examples, and their imposition could well improve the measure or its performance. By contrast, a negative barrier, such as inadequate legislation, may cause delays and excess costs in the implementation of the measure.

Based on the discussions with the Core Cities, the negative barriers have been grouped into three categories:

- **Legal and institutional:** lack of legal powers to implement a particular measure, and legal responsibilities which are split between agencies, limiting the ability of the city authority to implement the affected measure;
- **Financial:** budget restrictions limiting the overall expenditure on the strategy, financial restrictions on specific measures, and limitations on the flexibility with which revenues can be used to finance the full range of measures;
- **Political and cultural aspects:** lack of political or public acceptance of a measure, restrictions imposed by pressure groups, and cultural attributes, such as attitudes to enforcement, which influence the effectiveness of measures.

Results from the surveys in the core cities are reported in separate sections for each of these categories.

6.1.3 Methodological Approach

Identification of barriers and constraints was carried out through two parallel activities. First, a common survey along with task 14 was conducted by 22 technical experts responsible for city planning in the 6 core cities. These results were supplemented by a check-list where respondents identified specific barriers for each of the measures selected in Section 5, indicating whether they viewed them as rigid or flexible and suggested ways to overcome them. Appendix 4 summarises the principal barriers identified for each type of measure.

6.2 Legal and Institutional Barriers and Constraints

Among land use measures, many core cities identified flexible constraints in their ability to influence land use patterns, largely because they did not have the legal power to require or refuse particular types of development. Most identified rigid constraints on value capture, which is not legally permitted, and on modifications to property taxes to influence transport system performance.

Among attitudinal measures, flexible working hours and company travel plans were seen as having flexible constraints, in that city authorities could over time encourage their implementation, but could not require them.

Most infrastructure projects and management measures were directly affected by flexible legal constraints which specify the ways in which they can be developed, the consultation process for them, and the approaches to implementation.

Information provision was generally thought to have few if any legal constraints, other than the ability to require an operator to implement them.

Pricing measures were typically identified as having the widest range of legal constraints. In the case of road pricing and charges for private parking, legislation is not available. For other charges and fares, there are flexible legal barriers on the extent to which they can be altered, or on the ability to require operators to do so.

Table 29 summarises the principal legal barriers in the core cities, and the extent to which the cities see them as major or minor constraints on their ability to determine their land use and transport strategies.

Table 29 Measures for which legal barriers are a constraint in Core Cities.

(E = Edinburgh, H = Helsinki, M = Madrid, O = Oslo, S = Stockholm V = Vienna)

Measure	Major constraint	minor constraint	no constraint
Land-use	MS	EOV	H
Road building	MS	EHV	O
Public transport infrastructure		MS	EHO
Traffic management	M	EHOS	
Bus and rail operations	EV	HOS	M
Information provision		OSV	EHM
Pricing measures	EMSV	OH	

The survey cities were asked about the extent to which legal barriers imposed constraints on different types of measure. The results are shown in Table 30. Our survey suggests that land-use, road building and pricing are the policy areas most commonly subject to legal constraints, with between 31-41% of cities stating that there were major legal barriers. Road building, pricing and land use measures experience the greatest legal constraints, while information measures are substantially less constrained than the other measures. A greater proportion of small and large cities view legal barriers as imposing major constraints than do medium sized cities. Large cities are more likely to perceive legal barriers on road building and pricing measures.

Table 30 Measures for which legal barriers are a constraint in survey cities (number of cities).

Measure	Major constraint	Minor constraint	No constraint	NS
Land-use	17	24	10	3
Road building	18	25	8	3
Public transport infrastructure	12	27	12	3
Traffic management	8	25	18	3
Bus and rail operations	14	22	14	4
Information provision	0	13	39	2
Pricing measures	22	20	10	2

6.3 Financial Barriers and Constraints

Many core cities suggested that there were financial constraints on their ability to introduce land use measures; in practice most of these were an inability to impose land taxes for legal reasons, as described in section 6.2.

No core cities suggested that there were any financial barriers on attitudinal measures.

Infrastructure measures were seen as having the widest ranging rigid financial constraints, largely because of their high costs, but in some cases also because of constraints on the ability to use finances flexibly across a range of different types of project.

Among management measures, changes in public transport service levels were seen as having the most frequent rigid financial constraints, simply because of their high cost. Some core cities also considered that traffic management measures and intelligent transport systems were constrained by budget restrictions.

Most core cities viewed information systems as expensive, and constrained rigidly by budget limitations.

Some core cities identified rigid constraints on charges on car use, although in practice these were legal constraints on the ability to implement them. Most core cities suggested that there were at least flexible financial constraints on the modification of fares levels and structures, because of the costs of subsidising them.

Generally, cities were reliant on public funds to overcome financial constraints, and made little use of private finance for the purpose. Few were able to use transport finances flexibly across the full range of policy measures.

Table 31 summarises the severity of the financial constraints on each of the types of measure in the core cities. Table 32 provides similar information for the survey cities. Our survey suggests that road building and public transport infrastructure are the two policy areas which are most commonly subject to financial constraints, with 80% of cities stating that finance was a major barrier. Information provision, again, was the least affected in terms of financial constraints. The only differences by city size are that small cities are less likely to perceive financial constraints on land use policies, and large cities are even less likely to identify financial constraints on information measures.

Table 31 Measures for which financial barriers are a constraint in Core Cities.

(E = Edinburgh, H = Helsinki, M = Madrid, O = Oslo, S = Stockholm V = Vienna)

Measure	major constraint	minor constraint	no constraint
Land-use	E	H MOSV	
Road building	HSV	MO	
Public transport infrastructure	EHMOSV		
Traffic management	EM	HOSV	
Bus and rail operations	MOSV	H	
Information provision	E	MOSV	H
Pricing measures	EMSV	H	O

Table 32 Measures for which financial barriers are a constraint in survey cities (number of cities).

Measure	Major constraint	Minor constraint	No constraint	NS
Land-use	18	20	13	3
Road building	42	8	1	3
Public transport infrastructure	43	8	1	2
Traffic management	15	28	8	3
Bus and rail operations	29	16	6	3
Information provision	6	23	23	2
Pricing measures	20	21	11	2

6.4 Political Barriers and Constraints

Few land use measures were seen to have political barriers; the main exceptions were parking standards and property taxes, where the city might well wish to avoid adverse reactions from businesses.

Public willingness to respond to awareness campaigns, company travel plans and opportunities to use telecommunications were seen as flexible political barriers to awareness measures.

Infrastructure measures were generally thought to suffer from political constraints, largely related to lack of public acceptability of new developments. However, most core cities saw these as flexible barriers, which could be overcome in time or through better design.

Management measures were also thought to experience political barriers, particularly in terms of the acceptability of modifications to traffic management. In most cases these were again flexible, and could be overcome by consultation and better design. However, several cities thought that the political barriers on regulatory controls of car use and parking were much more rigid.

Some core cities saw flexible political constraints on the implementation of information measures. In the main these related to the willingness of politicians to pursue them, or the difficulty of encouraging private investment in them.

Most cities saw serious political constraints on any charges on car use, although cities differed as to whether these were rigid, or could be overcome with time.

In most core cities there are deep gaps in attitudes and priorities between the political parties. Left wing and centrist parties are normally more willing to accept public transport, while the more conservative factions are more supportive of private car use.

Most core cities agreed that land use and transportation planning were not considered very important issues in municipal election campaigns. However, transport planning has come increasingly under the spotlight of public awareness during the past few years. Politicians are not expected to possess specific technical knowledge, but management skills are highly valued and they usually take professionals' advice.

In theory, the public opinion is initially in favour of sustainable transport plans and restrictive traffic measures. However, once the measures have been introduced, those affected by them take a stance against them. This situation is aggravated when people are offered no real alternative to using their cars.

Many cities commented that the larger land use and transport projects took a considerable time to implement, and that public acceptability issues added significantly to the delays in implementation.

Table 33 summarises the seriousness of the political constraints for each types of measure.

Table 33 Measures for which political barriers are a constraint in Core Cities.

(E = Edinburgh, H = Helsinki, M = Madrid, O = Oslo, S = Stockholm V = Vienna)

Measure	major constraint	minor constraint	no constraint
Land-use	MOSV	EH	
Road building	EHMOSV		
Public transport infrastructure	HOS	EMV	
Traffic management	MO	SV	
Bus and rail operations	OS	V	HM
Information provision		SV	EHMO
Pricing measures	EHMOSV		

Table 34 provides the summary information for the survey cities. Our survey suggests that road building and pricing are the two policy areas which are most commonly subject to acceptability constraints, with around 50% of cities stating that acceptability was a significant constraint on road building and pricing measures. Public transport operations and information provision were the least affected by acceptability constraints. Generally, large and small cities were more likely than medium sized cities to identify political barriers. Large cities were much more likely to perceive such barriers for road and rail infrastructure projects; small cities were more likely to identify them for pricing measures.

Table 34 Measures for which political barriers are a constraint in survey cities (number of cities).

Measure	major constraint	minor constraint	no constraint	NS
Land-use	22	25	3	4
Road building	26	18	5	5
Public transport infrastructure	21	20	8	5
Traffic management	14	25	11	4
Bus and rail operations	6	34	10	4
Information provision	1	12	36	4
Pricing measures	29	16	3	6

6.5 Policies to remove Barriers

In most cases barriers are complex, since they often conflate legal, financial and cultural issues. In this section we make some suggestions on policies with a view to overcoming these barriers.

- **Comprehensive land use and urban transport planning.**

Policies to generate optimal sustainable land use and transport planning are better identified and developed in the framework of comprehensive urban transport plans. However, in only a handful of countries are such plans legally binding. In many cases, policies are mentioned in strategic policy documents without any reference to specific tools for implementation.

- **A key role of local administrations and public transport authorities**

Public transport authorities should play a key role in developing these policies. The land use/ transport systems connection has to be strengthened, making them work together so as to reach a more efficient, environmental-friendly system. Even though involvement from all the administrative levels is necessary, local leadership seems to be most appropriate and might be the key partner to this strategy.

- **The viability of pricing schemes**

The development of urban road pricing schemes, such as those introduced in some Scandinavian cities, could represent a unique opportunity to the financing of urban transport schemes. The money collected can be used to finance the public transport system or new road construction. There is apparently a change of attitude observed among the public, who may be now more interested in knowing how this money is spent. Policies to reduce car use could probably bring about a more balanced situation when they are also assessed as an alternative way of generating finance for investment. However, there is still a need to clearly define an appropriate legal framework to achieve this.

- **The role of the private sector**

A complementary role needs to be identified for the private sector. Private financing could be re-oriented from conventional projects towards new needs, but there is little experience in this field, and prospective private partners might construe it as an additional risk. Nevertheless, this would be an efficient way to associate the private sector with broader land use/transport management strategies. Additional services seem to offer slow financial returns and would probably need extensive public subsidies. Otherwise, they should be linked to broader strategies where the “private for-profit” sector is given the chance to participate.

7 Conclusions

The review of decision-making processes has demonstrated that they are complex, and differ considerably from one city to another. In particular:

- most cities consider that their decisions are based on a combination of objective-led and consensus-led approaches, but there is considerable diversity;
- cities are more likely to have direct responsibility for land use and traffic management and more likely to share responsibility for infrastructure; public transport services, information and pricing are more likely to be the responsibility of others;
- cities' decisions are often strongly influenced by adjacent authorities and national government; the impact of regional authorities depends on the local government structure; the EU currently has only limited impact;
- while the majority of cities develop medium and long term plans, the time horizons vary considerably;
- public involvement ranges from intensive participation to limited involvement in public inquiries on specific projects
- cities are most likely to involve the business community in their decisions, and least likely to involve the media;
- the business community is considered to have the greatest influence on decisions, followed by the media and environmental groups; transport users are considered to have the least influence;
- for most of these attributes, there are differences between cities of differing size.

The surveys conducted in this work package have confirmed the appropriateness of the conceptual structure specified in Figure 1. They have also defined the detail of a number of elements of that structure. In particular:

- we have defined an overarching sustainability objective (section 3.2) and six key sub-objectives (section 3.3);
- we have identified the key attributes of past trends and future scenarios (sections 4.2 and 4.3);
- we have developed a list of 80 potential policy measures (section 5.2); and
- we have categorised the main barriers as legal, financial and political, and distinguished between ones which are rigid, and those which are flexible (sections 6.2-4).

Our survey of European cities has demonstrated the ways in which the importance of these objectives, scenario attributes, measures and barriers vary by type of city. In particular:

- smaller cities placed more emphasis on population growth, and less on economic growth, in past trends and future scenarios;
- smaller cities were less interested in awareness campaigns, rail infrastructure, bus priorities and real time information; medium sized cities placed greater emphasis on parking charges and less on road pricing; large cities were less concerned with land use policies and fares;

- large cities were more likely to experience legal barriers on infrastructure projects and pricing measures;
- small cities were more likely to perceive political barriers to pricing measures, and large cities to infrastructure projects.

While these results provide a valuable structure for our further work in the project, there are four areas which have been highlighted on which there is still some considerable uncertainty:

- while we have identified a range decision-making structures, there is as yet little evidence on which of these work best, or are most appropriate in different circumstances (section 2 generally);
- while we have begun to classify indicators to be used in assessing performance against objectives, we have yet to develop a fully acceptable list of such indicators, and there remains considerable doubt among cities on the value of these indicators (section 3.4);
- while most cities accept the need to define scenarios, there is as yet little understanding of the role of scenario planning in strategy formulation (section 4.5); and
- while many cities accept the need to develop packages of measures as part of an integrated strategy, there is as yet incomplete awareness of the ways in which this can best be done (Section 5.4).

All of these issues merit further study in subsequent work packages.

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APPENDIX 1

Cities' Decision Making Structures

EDINBURGH

Edinburgh is the capital city of Scotland which, since 1999, has enjoyed devolved government within and as a part of the UK. The Scottish Executive, the new governing body, now has substantially wider powers over transport and land-use policy in Scotland than did the Scottish office prior to devolution and these powers are democratically controlled through the Scottish Parliament. There is, therefore, a UK, a Scottish and an Edinburgh city dimension to transport and land-use policy in Edinburgh. In addition, there is a private, as well as public, sector dimension to transport planning as the majority of public transport in Scotland (as it is in great Britain as a whole) is operated by the private sector.

The guiding principles for UK-wide transport and land-use policy are set out by the UK government, through the Department of the Environment, Transport and the regions (DETR). The Scottish Executive then provide guidance on the application of these principles to transport and land-use planning in Scotland.

City of Edinburgh Council's land-use and transport responsibilities are managed together within a single department. This department has exclusive responsibility for land-use planning and for local roads, whilst it has varying degrees of shared responsibility for strategic roads and local public transport.

The vast majority of roads in Edinburgh are classified as Local roads which are the sole responsibility of City of Edinburgh council. The planning of strategic roads is the responsibility of the Scottish Executive, though City of Edinburgh Council would clearly be involved as a key stake-holder. Rail planning across Great Britain is the responsibility of the Shadow Strategic Rail Authority, an institution of UK national government, though it is dependent upon the collaboration of the private sector train operators and the private sector infrastructure manager for implementation. Local authorities would also be involved in this process, particularly for local rail planning. Thus, whilst the Shadow Strategic Rail authority is responsible for over-seeing the planning of the rail system, Scotrail (as the operator of all local rail services and some strategic rail services), Virgin Trains and Great North Easter Railway (as operators of the other strategic rail services in Scotland), Railtrack (as the rail infrastructure manager), the Scottish Executive and City of Edinburgh Council, perhaps along with other neighbouring local authorities, would be involved in the process in Edinburgh. Bus planning would, in the main, be the responsibility of the private sector bus operating companies, though with involvement and influence from City of Edinburgh Council through it being responsible for local roads and for allocating subsidy to operators.

HELSINKI MA

In Finland municipalities have planning monopoly concerning land use and transport plans. Master plans are guided by province level plans prepared by provincial government and approved by national government. In some cases master plans need to be confirmed by Regional Environment Centres, but otherwise governmental involvement is rare.

Road Administration is in charge of planning, financing, building and keeping of public roads, but co-operation with municipalities during planning is keen and also vital if the plans are to be fulfilled easily. Some local roads are kept jointly by the Road Administration and the municipality. Streets are solely planned, financed, build and kept by the municipalities.

In the Helsinki Metropolitan Area some responsibility has been transferred from the four cities Helsinki, Espoo, Vantaa and Kauniainen to the Metropolitan Area Council, YTV. Such areas of responsibility are regional public transport, waste management, general land use and transport planning and air pollution control and monitoring. The Council also has advisory and research functions.

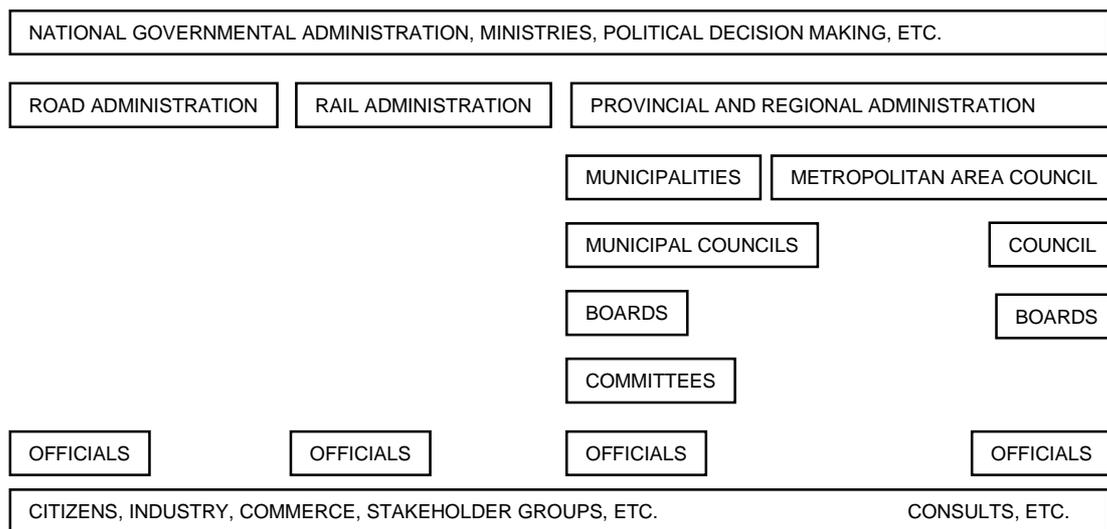


Figure A-1 Organisational framework and actors in Helsinki Metropolitan Area

The organisational framework and different actors are shown in Figure XX. There are differences between the four cities of the area. As an example, Helsinki as the biggest city has held more independence in internal public transport planning. Vantaa has already joined its internal public transport planning to YTV organisation. Kauniainen, being the smallest of the cities and totally enclosed in Espoo, relies heavily on Espoo and YTV in public transport questions.

MADRID MA

Competencies in Spain are divided in three administrative levels. Central Government is responsible for trunk road network and rail network. Then the 17 Regions are responsible for land use co-ordination and planning. Regions manage second level road networks and public transport within their territories. Finally, Municipalities have competencies on local transport plans and land use development plans. Regional Government revise and approve development plans submitted by Municipalities.

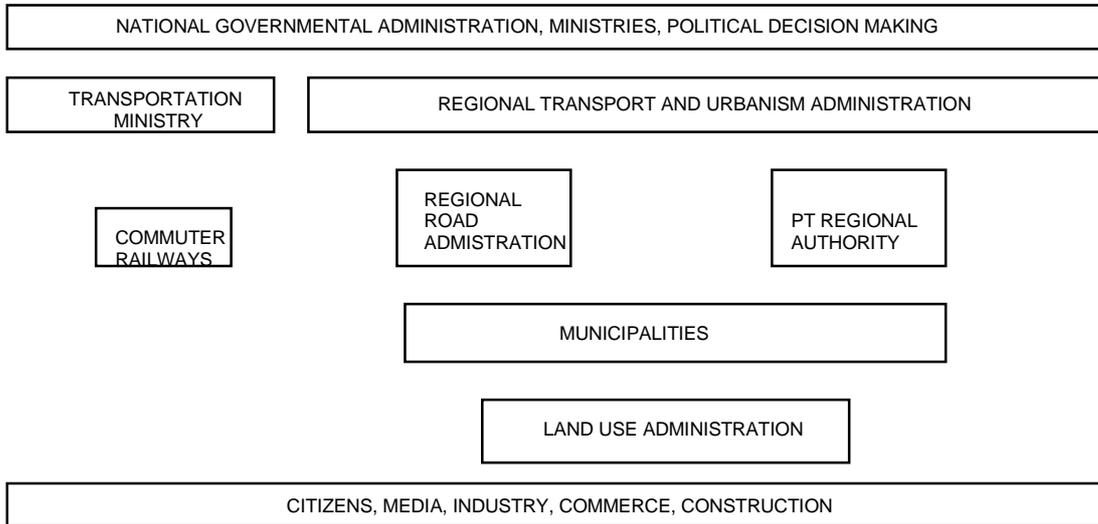


Figure A-2 Organisational framework and actors in Madrid Metropolitan Area

In the case of Madrid Region, in 1986 was founded a Regional Public Transport Authority (Consortio Regional de Transportes) which assumed competencies in planning of public transport lines, fares levels and modal integration.

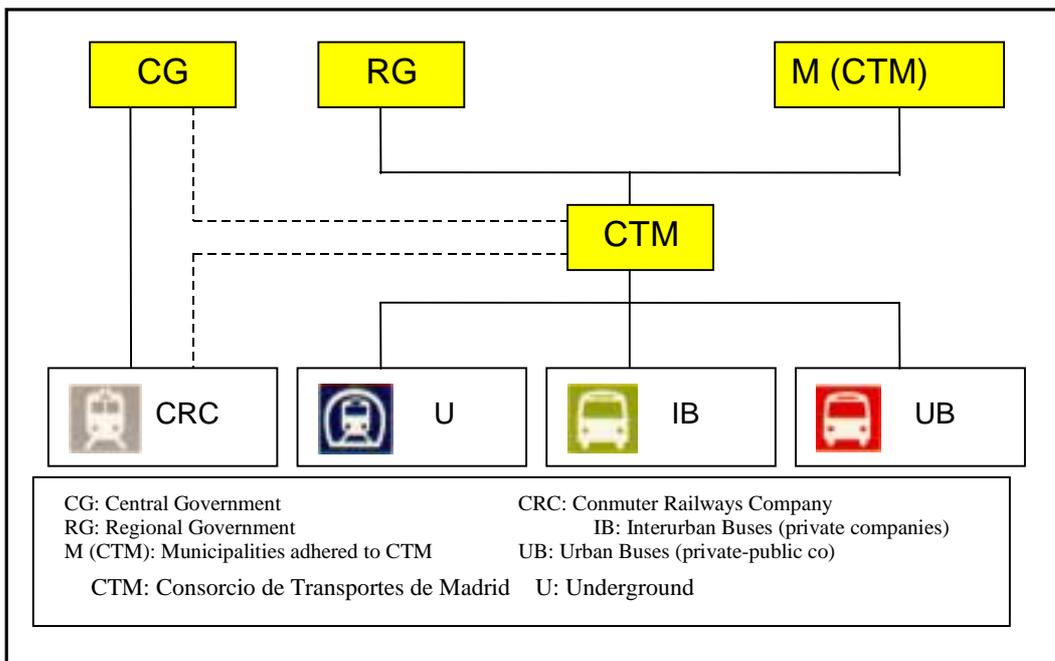


Figure A-3 Institutional framework for Public Transport (Region of Madrid)

OSLO

There are three levels of government in Norway: central, county and municipal government. Oslo is an exception as it can be categorised both as a county and as a municipality. In the context of transport and land-use planning Akershus County and Oslo should be considered one system. Akershus County consists of 22 municipalities.

National government. 17 Ministries, among others:	
<ul style="list-style-type: none"> • Ministry of Transport and Communications. Agencies include the Public Roads Administration, the National Rail Administration (rail infrastructure), and Norwegian State Railways (NSB). The Public Roads Administration is in charge of national and county roads and has a district office in each county (including Oslo). • Ministry of the Environment. Responsibility for regional planning. Especially relevant laws/guidelines: The Planning and Building Act, and the national guidelines for integrated transport and land-use planning. 	
Oslo City Council: Among the counsellors are:	Akershus County Municipality (democratically elected body of the county):
<ul style="list-style-type: none"> • Counsellor for Development. Departments include the Planning and Building Department (land-use planning). • Counsellor for Transport and Environment. Subordinate bodies include the Transport Department (planning and administration of municipal roads) and the public transport company Oslo Sporveier. 	<ul style="list-style-type: none"> • Transport sector: construction and maintenance of county highways, the co-ordination of subsidies to public transport and school bussing, and traffic safety. • Land-use sector: regional planning and co-ordination (county plans are required by law)
	Municipalities in Akershus

Figure A-4 Actors and responsibilities in land-use and transport planning

Municipal planning according to legislation includes:

- Long-term plan (challenges and strategies in 10-12 years perspective)
- Financial plan (4 years)
- Programme of actions (concrete goals and strategies, sector-wise)
- Sector plans and land-use planning (plans for some specific sector or for some specific geographic area of the county or municipality)
- Annual budgets

Municipalities should make the strategic (long-term) plan publicly available. If there are objections from affected public agencies the plan must be sent to the Ministry of Environment for decision. However, the Ministry's access to make changes in the plan is limited.

STOCKHOLM

Municipalities in Sweden have monopoly over land use and transport planning. Municipalities are responsible for their own economy and have the right to plan their land use. Even so, the Stockholm County Council, the regional planning body for Stockholm, has a key role in the planning process. The Planning and Building Act describes the role which includes the co-ordination of municipal outline planning and providing the State and the municipalities with information on issues such as land use, traffic and environment. County Administration Board is responsible for co-ordinating regional plan with national interests and for safeguarding that planning legislation is adhered to.

Municipalities, together with National Road Administration and National Rail Administration have the responsibility for the transport infrastructure.

Figure A-5 is a diagrammatic presentation of the organisational structure of different actors in the Stockholm County.

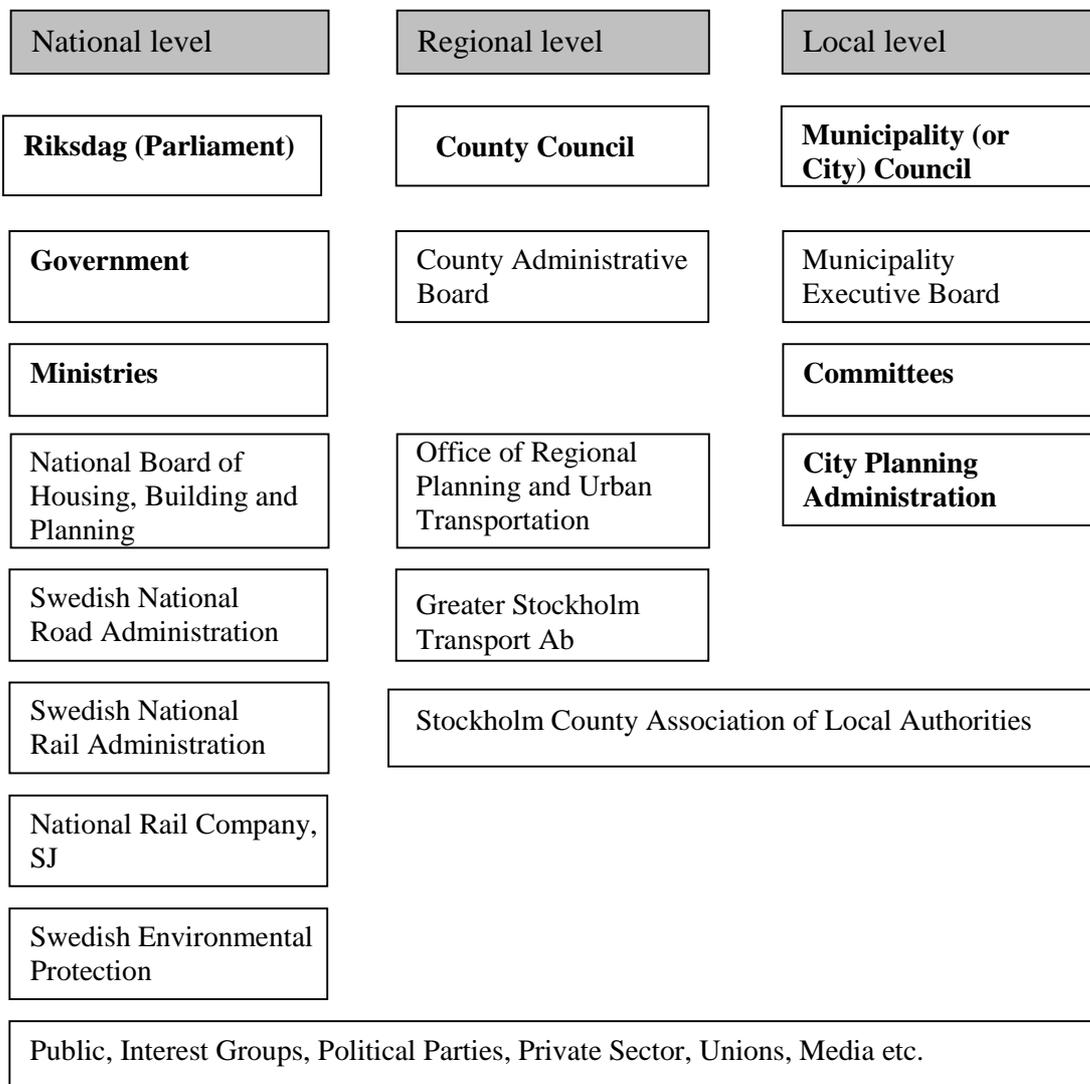


Figure A-5 Organisational structure of different actors in the Stockholm County

VIENNA

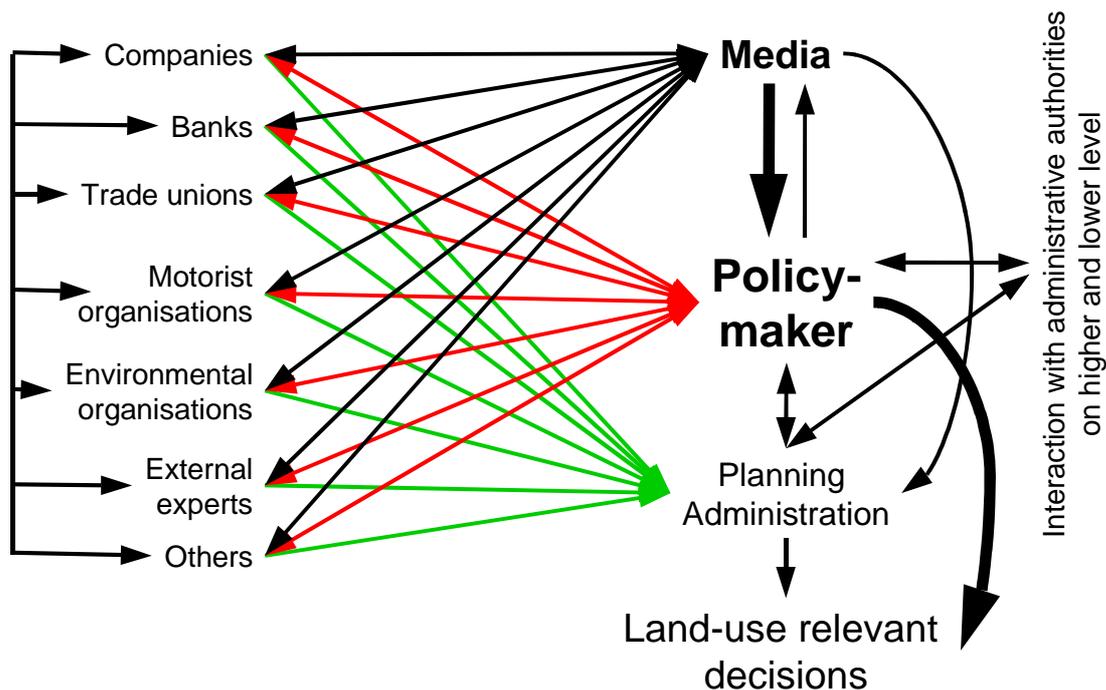


Figure A-6: Interaction between different players involved in urban land-use and transport decision making processes (KNOFLACHER, PFAFFENBICHLER ET. AL., 2000)

KNOFLACHER H., PFAFFENBICHLER P., FISCHER P. (2000), "Wirtschaftliche Vorteile für österreichische Regionen durch eine institutionelle Koordinierung von Verkehrs- und Raumplanung (Economic Benefits of an Efficient Institutional Coordination between Transport and Land Use policy, Illustrated on Austrian Level BENEFICIAL)", COST332, unveröffentlichter Forschungsbericht im Auftrag des österreichischen Bundeskanzleramts, Wien, 2000

Vienna City Administration

Source: <http://www.wien.gv.at/english/mib/cityadministration/constitution.htm>; accessed 04/12/00

Constitution

The general administrative structure of Austria

There are 3 levels of administration in Austria:

- Federal State
- 9 Federal Provinces (Burgenland, Carinthia, Lower Austria, Upper Austria, Salzburg, Styria, Tirol, Vorarlberg, Vienna)
- About 2,300 municipalities

The whole federal territory is subdivided in municipalities.

Administrative functions of the federal state and of the federal provinces

- Legislation and enforcement are federal tasks in general fields such as foreign affairs, civil law, industrial and trade law, federal police force
- Direct federal administration: enforcement by federal authorities
- Indirect federal administration: enforcement by provincial authorities

- Citizenship, police, etc.: federal legislation, enforcement on the provincial level
- Hospitals, electricity, etc.: federal legislation on general provisions, implementation regulations and enforcement on the provincial level
- Legislation and enforcement are provincial tasks in all areas not assigned to other levels, such as building law, nature conservation law

The City of Vienna

The City of Vienna is both a municipality and a federal province. This means that

- the City Council also fulfils the functions of the Provincial Diet
- the City Senate also fulfils the functions of the Provincial Government
- the Mayor is also the Governor of Vienna
- the City Administration is also the Office of the Provincial Government
- the Chief Executive Director is also the Head of the Office of the Provincial Government

The distribution of finances between the federal state, the provinces and the municipalities

- Duties collected on the federal level: e.g. corporation tax
- Taxes divided between the state and the provinces: e.g. income tax, value added tax
- Exclusive provincial or municipal taxes: e.g. land and real property tax, local tax, beverage tax
- Municipal taxes according to independent resolutions: the federal state and the federal provinces can authorise the municipalities to levy duties

Distribution of finances (rounded figures of 1999)

- revenues: ATS 131 billion
 - Taxes and duties: ATS 19 billion
 - Federal subsidies: ATS 60 billion
 - Services: ATS 21 billion
 - Credits and loans: ATS 3 billion
 - Other revenues: ATS 27 billion
- expenses: ATS 140 billion
 - Personnel: ATS 35 billion
 - Pensions: ATS 9 billion
 - Housing promotion: ATS 9 billion
 - Credits for third parties: ATS 9 billion
 - Debt service: ATS 11 billion
 - Investments: ATS 15 billion
 - Other expenses: ATS 52 billion

The Viennese administration is subdivided into eight Administrative Groups:

- Integration, Women's Issues, Consumer Protection and Personnel
- Finance, Economic Affairs and Vienna Public Utilities
- Youth, Social Affairs, Information and Sports
- Cultural Affairs
- Public Health and Hospitals
- Planning and Future Developments
- Environment and Transport Co-ordination
- Housing, Housing construction and Urban Renewal

Three of them have land-use and transport related responsibilities. The Administrative

Groups are subdivided into Municipal Departments.

APPENDIX 2

Some definitions of sustainability

The standard definition of sustainability is of course due to the Brundtland Commission (1987), who defined sustainable development as *development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs*.

To make this definition operational, we need to define the needs of the present as well as future generations and to identify the factors that threaten the ability to meet the needs of future generations.

One important point of departure is Hicks' definition of income: "... we ought to define a man's income as the maximum value which he can consume during a week, and still expect to be as well off at the end of the week as he was in the beginning." (Hicks 1946, p. 172). Applied to a society and to years and decades rather than weeks, this is the maximum sustainable welfare level. Taking into account that the welfare of each generation depends on the stock of man-made and natural capital, and that the returns on this capital are uncertain, Asheim and Brekke (1997) arrive at the following definition:

A generation' management of its stocks of man-made and natural capital is sustainable if its level of consumption can be shared by the next generation (in the sense of certainty equivalents) even if the latter abides by the requirement of sustainability.

This definition is useful in theoretical economic models, but needs to be specified further to guide policy at a more practical level.

The following definition of sustainable development is widely used:

Development is sustainable if the rates of use of renewable resources do not exceed their rate of regeneration, the rates of use of non-renewable resources do not exceed the rate at which sustainable renewable substitutes are developed, and pollution rates do not exceed environment's assimilative capacity. (Daly 1991).

An application to transport of this definition is the definition of Environmentally Sustainable Transport used in OECD's EST project:

An environmentally sustainable transport system is one that does not endanger public health or ecosystems and meets needs for access consistent with (a) the use of renewable resources below their rates of regeneration, and (b) the use of non-renewable resources below the rates of development of renewable substitutes.

This definition is "strong" because it puts upper limits on each resource, and does not trade off resources against each other. It is a bit unclear exactly what point (b) means. The development of renewable substitutes does not follow a predetermined development path, but depends very much on how much is left of the resource and accordingly what its price is. The rate of regeneration of renewables also depends on prices, investment etc. Similarly, it is not an easy task to determine what shall be meant by needs for access and a transport system not endangering public health. Careful evaluation is needed to set the appropriate targets.

There is no doubt that if appropriately specified, a transport system corresponding to this definition will be environmentally sustainable, but there may also certainly exist other environmentally sustainable transport systems that are more efficient and just.

Very often, sustainability is thought to have three components: Environmental, economic and social (or political). This is for example the approach taken in the

PROPOLIS project, which proceeds from this starting point to construct indicators for each of the three components. Environmental sustainability requires certain environmental targets to be met. Economic sustainability may concern intergenerational equity, as measured by the welfare level achieved by each generation, while social sustainability may concern intragenerational equity issues. How these three components are to be integrated in a unified concept and measured in a unified way is however not clear if the definition of sustainability only consists of definitions of the three components separately.

It seems to be important to distinguish between two questions about sustainability. The first is: What is the maximum level of welfare that can be continued forever, if once we have acquired the stocks of natural and man-made capital that are needed for it? The second is: What is the best way of getting from where we are now to this sustainable situation? The two are of course linked, because it does not make sense to ask about the maximum level of welfare that can be continued forever for a level of stocks that cannot be achieved in a sensible way, starting from the present situation. The interests of the presently living generations cannot be ignored altogether. On the other hand, the sustainable welfare level given the stocks that we have right now is possibly not very high. To achieve a higher level of welfare *in the very long run*, there might be a case for making some initial sacrifices and do some saving and investment.

Heal (1998) defines sustainability by the following two axioms:

- a symmetric treatment of the present and of the long-term future, which places a positive value on the very long run, and
- explicit recognition of the intrinsic value of environmental assets.

He goes on to say that taking these two points seriously "will lead to the selection of what one thinks of intuitively as "sustainable" policy options. There is no need for a formal definition of sustainability: it is a derived concept, and the best strategy is to "go behind" it and understand and model the concerns underlying it. These appear to be quite amenable to economic analysis."

Bereheny (1990) defines *urban* sustainability as:

...the achievement of urban development aspirations, subject to the condition that the natural and man-made stock of resources are not so depleted that the long term future is jeopardised.

Concerns about intergenerational justice (economic sustainability) and concerns for stocks of natural resources (environmental sustainability) are obviously at the heart of the concept of sustainability. In addition, the concern about intragenerational equity (social sustainability) is obviously to be included.

All of these aspects are reflected in our definition of a sustainable urban land use and transport system (see main text). Hopefully, it widens the scope from an environmentally sustainable transport system to an overall sustainable urban land use and transport system, while avoiding some of the weaknesses of the OECD EST definition and identifying some of the resources – man made or natural – that will be essential for the welfare level in the city of tomorrow.

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APPENDIX 3

Generic Scenarios for European Cities

Many recent studies have relied on the development of medium-and long term generic scenarios for EU (or Europe) as part of their work (see for example research projects SCENARIOS, SEA, POSSUM, STREAMS, CODE-TEN, ASTRA, the EST project by OECD and European Union Energy Outlook to 2020). There are minor differences in their approach to the construction of these scenarios, often referred to as a Business as Usual or a Base Scenario. These scenarios rely on the projection of the present trends concerning demand and modified by likely changes in technology and legislation. Most of these studies do not address uncertainties in future developments that are related with the exogenous variables that formulate these scenarios. Even though there are different levels of uncertainties associated with the exogenous variables in short- medium- and long term at a European scale, the projection of some of these variables for the cities in Europe have higher levels of uncertainties associated with them. Cities of different sizes and in different regions of Europe will have different share of the future growth in economy, population, employment, etc.

Economic development and changes in disposable household income coupled with the growth in population and other demographic changes are probably the most important exogenous variables that have contributed to the growth in demand for travel, in particular by car. Different scenario studies suggest that these variables will continue to keep their significance in future developments. Other variables that are usually included in a scenario are relative prices of transport modes and technological changes or changes in fuel efficiencies. Changes in car ownership can be addressed as an exogenous variable in a scenario, even though some studies have treated this variable as an endogenous variable. Modelling capability determines the choice.

The survey of Core Cities indicates that in the context of urban areas, location variables such as "Changes in work location", "Changes in surface coverage of city", "Changes in urban sprawl " are other important variables for a scenario (see section 4.3 on scenarios). These are the types of variables that are not addressed in previous studies that have used a base scenario on a European scale. Furthermore, the variations of these trends among cities of different sizes have received little attention (almost all studies that focus on the density of built areas use cross sectional data, rather than time series), even though there seems to be a consensus that these are common trends for urban areas.

In the following we address some of the most important variables that should be included in a generic scenario and the projection of some of these variables on a European level.

Demographic Outlook

Demographic conjectures are quite crucial in long-term forecasts with relatively low level of uncertainty. World Bank and US Department of Commerce are widely source for population forecasts. Another source is "European Macro-economic Projections" (1997) and "Preliminary Primes Version 2 Baseline Assumptions (1998). According to Primes, the population growth in EU will decrease from an annual growth rate of about 0.4 percent over the 1985-1995 period to zero growth between 2010 and 2020. There are regional differences in the forecasts of population in Europe. Larger urban areas seem to grow faster than the smaller urban areas, due to external migration. These factors increase the

level of uncertainty associated with the forecast of the population on a "city level".

An important concern is the aging of the population in EU. There are some projections available on the profiles of aging in different parts of Europe (see for example different studies by OECD in website: <http://www.oecd.org/subject/ageing/>). Average household size is another important determinant of demand for travel. The average size of household is predicted to decrease from 2.6 in 1995 to 2.3 in 2020 (Primes).

Economic Outlook

Global relations and developments formulate the underlying assumptions of an economic scenario. Economic growth is associated with a higher level of uncertainty that the demographic variables, since the underpinning assumptions for the economic developments are more uncertain and usually involves judgements (optimistic or pessimistic views of the developments). OECD and EBRD are two main sources for growth in real GDP and unemployment in the Europe (see for example ECONOMIC OUTLOOK No.68: <http://www.oecd.org/eco/out/eo.htm>). An example of economic outlook in Europe is by Primes, which forecast the annual percent change in GDP of 2.6 between 1995-2000 to eventually decrease to 1.7 in the period of 2015-2020. The associated level of uncertainty with forecasts of economic growth and unemployment for European cities is even higher than a European level in a similar to demographic outlooks. Another important factor is the structural changes in the economy with consequences for employment structure.

Relative prices and energy efficiencies of travel modes

Assumptions related to changes in oil prices are usually most important for the transport sector because of its high dependency on fossil fuels. Other important factors are the assumptions about technological developments as well as legislation (on European or National levels). These are the underlying factors for bringing in uncertainty in the predictions of these variables and their variation on a European level. "Primes" provides forecasts of energy efficiencies by mode as well as the forecasts of the passenger transportation efficiency improvements in different European countries.

APPENDIX 4

Summary Table of Barriers

POLICY OPTIONS	Rigid / Flexible	Good/ Bad	Nature of the barrier
LEGAL BARRIERS			
* Land use options			
-development patterns -extra-value taxes -taxes on the infrastructure	R	B	-extremely rigid legislation -lack of an adequate legal framework -lack of an adequate legal framework
* Pricing measures			
-parking charges -road pricing	R	B	-not allowed taxation on private parking places -lack of political willingness
* Attitudinal and behavioural measures			
-flexible working hours -company travel plans	F	B	-lack of information and legislation -lack of appropriate legislation to foster them
* Management measures			
-car usage -parking control -cycle lanes&parking , priorities -lorry routes and bans	F R	B G	-high dependence on car for daily trips -lack of political willingness and public acceptability -lack of legislation (North), lack of culture (South) -complicated local legislation
FINANCIAL BARRIERS			
* Land use options			
-extra-value taxes	R	B	-lack of legislation to levy taxes
* Management measures			
-ITS, UTC -PT service levels	R	B	-lack of political willingness and budget -budget constraints
* Infrastructure measures			
-road construction -off-street parking -to influence PT use	R R F	B B B	-lack of land&budget availability -lack of strict legislation -lack of political willingness to foster PT
* Information provision			
-real time driver info -real time passenger info -PT staff resources	F	B	-lack of political willingness to invest -lack of political willingness to invest -lack of budget availability
* Pricing measures			
-PT fare levels -road pricing	R R	B B	-lack of political willingness to subsidise PT -lack of political decision and appropriate legislation
SOCIO-POLITICAL&CULTURAL BARRIERS			
* Attitudinal and behavioural measures			
-public awareness campaigns -teleworking	R F	B B	- <i>pro-nimby</i> measures -lack of information, no culture
* Management measures			
-traffic calming -physical restrictions -regulatory restrictions	F	B	-public reluctance

APPENDIX 5

PROSPECTS Task 16: Questionnaire and summary of responses

Part A Summary of responses

Population

20k- 100k	14
100k- 250k	20
250k- 500k	8
500k-1000k	7
1000k-2000k	4
n/s	1

Population growth

Falling	15
Steady	4
Low	14
Moderate	19
High	2

Economic activity (multiple answers)

Services	34
Tourism	16
Industry	10
Manufacturing	9
Finance	7
Education	4
Information	
technology	3
Administrative	2
Agriculture	2

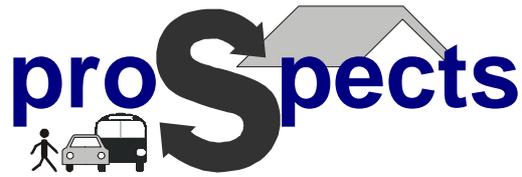
Country

Austria	2	
Belgium	1	
Bulgaria	2	
Czech Republic		1
Finland	2	
France	9	
Germany	3	
Ireland	2	
Italy	1	
Lithuania	2	
Norway	3	
Poland	2	
Portugal	2	
Spain	10	
Sweden	3	
Switzerland	2	
UK	7	

Willing to join email network

Yes	37
No (n/s)	17

Part B Questionnaire



**CITY SURVEY ON DECISION-MAKING IN LAND USE
AND TRANSPORT STUDY**

BACKGROUND INFORMATION

To help us categorise responses, please indicate the following:-

Your city _____

Its population (in thousands) _____

Its rate of population growth _____
(falling, low <1% pa, moderate 1-3%, high >3% pa, don't know)

Its principal economic activities
(e.g. finance, manufacturing, tourism, services) _____

Your country _____

Your name _____

Your position _____

Note: this information will be treated in confidence. Individual cities and respondents will not be identified

If you wish to be included in the City email network,
please provide your email address: _____

A. APPROACHES TO DECISION-MAKING

Responsibilities

Q1. Please indicate, for each of the types of measure listed below, which are your city's responsibility, which are a joint responsibility and which are the responsibility of others? Where others are responsible, please identify them.

Measure	Your Responsibility	Joint Responsibility	Other's Responsibility	If Joint or Other please identify them
Land-use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Road building	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Public transport infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Traffic management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Bus and rail operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Information provision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pricing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Are all those measures which are your city's responsibility managed together (rather than in separate departments)? Yes No

Influences on your responsibilities

Q2. Please indicate the extent to which your ability to make decisions across the range of policy measures in question 1 is influenced by each of the following:

	Very much	Quite a lot	A little	Not at all
Adjacent authorities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regional authorities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
National government	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The EU	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Types of decision making approach

Q3 We have identified in our discussions three broad types of approach to decision-making:

1. Vision-led: an individual or committee has a clear vision of the measures needed to improve transport and land use in the city, and focuses all action on implementing them
2. Plan-led: objectives are specified, and the measures which best satisfy these objectives are determined, usually by analysis; the resulting plan is then implemented
3. Consensus-led: discussions take place between the stakeholders involved in transport and land use, and the measures implemented are those which attract the greatest support.

These are of course deliberately simplified descriptions, and many cities adopt a mix of them.

Which one of the following options best describes the approach in your city:

Tending to (1) <input type="checkbox"/>	Tending to (2) <input type="checkbox"/>	Tending to (3) <input type="checkbox"/>
A mix of (1) and (2) <input type="checkbox"/>	A mix of (1) and (3) <input type="checkbox"/>	A mix of (2) and (3) <input type="checkbox"/>

Forward planning

Q4. Does your city have:

	No	Yes	Over what period
A medium term plan	<input type="checkbox"/>	<input type="checkbox"/>	(years)
A long term plan	<input type="checkbox"/>	<input type="checkbox"/>	(years)

Modelling

Q5. In analysing your plans, does your city use:

	No	Yes	If so, which models?
Its own models	<input type="checkbox"/>	<input type="checkbox"/>	
Consultants' models	<input type="checkbox"/>	<input type="checkbox"/>	

Participation

Q6. For each of the groups below, please tick as many columns as apply for your city:

	Formally involved	Informally involved	Strong influence	Weak influence
Business representatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental Pressure groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transport user pressure groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
General public	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Media	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B. OBJECTIVES AND INDICATORS

Objectives

Q7. We have defined a sustainable urban transport and land use system as one which

- provides access to goods and services in an efficient way for all inhabitants of the urban area
- protects the environment, cultural heritage and ecosystems for the present generation, and
- does not endanger the opportunities of future generations to reach at least the same welfare level as those living now, including the welfare they derive from their natural environment and cultural heritage.

How appropriate is this definition to your city?

Very appropriate	Quite appropriate	Neutral	Quite inappropriate	Very inappropriate
<input type="checkbox"/>				

Q8. If you answered neutral, quite inappropriate or very inappropriate, please suggest an alternative definition:-

Q9. Please indicate how important each of the following sub-objectives is to your city

	Very important	Important	Quite important	Not at all important
Economic efficiency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Liveable streets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Equity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Economic growth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Indicators

Indicators can be:

- quantified, with money values assigned (e.g. time savings in Euros)
- quantified, without money values (e.g. time savings in hours)
- qualitative, (e.g. perceptions of congestion).

Q10. In monitoring performance, does your city use indicators which are:

	No	Yes
Quantified, with money values	<input type="checkbox"/>	<input type="checkbox"/>
Quantified, without money values	<input type="checkbox"/>	<input type="checkbox"/>
Qualitative	<input type="checkbox"/>	<input type="checkbox"/>

C. TRENDS AND SCENARIOS

Past trends

Q11. How important has each of the following been in determining trends in transport and land use in your city?

	Very important	Important	Quite important	Not at all important
population growth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
economic growth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
car ownership	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
employment structure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
employment location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)				
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Future Scenarios

Q12. How important is each of the following likely to be in determining future scenarios for transport and land use in your city?

	Very important	Important	Quite important	Not at all important
population growth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
economic growth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
employment location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
car ownership	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
size of urban area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)				
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D. POLICY MEASURES

Policy Measures

Q13. How important is each of the following policy measures as a contribution to your land use and transport plan?

	Very important	Important	Quite important	Not at all important
Development pattern	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Awareness campaigns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flexible working hours	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
New rail lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bus priority	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bus/rail frequency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Real time information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parking charges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Road pricing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bus/rail fares	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)				
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Combinations of Measures

Q14. For each of the measures listed below (including any others you have specified in Q13) do you attempt to combine it with other policy measures and if so which?

	No	Yes	If so which?
Development pattern	<input type="checkbox"/>	<input type="checkbox"/>	
Awareness campaigns	<input type="checkbox"/>	<input type="checkbox"/>	
Flexible working hours	<input type="checkbox"/>	<input type="checkbox"/>	
New rail lines	<input type="checkbox"/>	<input type="checkbox"/>	
Bus priority	<input type="checkbox"/>	<input type="checkbox"/>	
Bus/rail frequency	<input type="checkbox"/>	<input type="checkbox"/>	
Real time information	<input type="checkbox"/>	<input type="checkbox"/>	
Parking charges	<input type="checkbox"/>	<input type="checkbox"/>	
Road pricing	<input type="checkbox"/>	<input type="checkbox"/>	
Bus/rail fares	<input type="checkbox"/>	<input type="checkbox"/>	
Other (please specify)			
	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	

E. BARRIERS TO IMPLEMENTATION

Legal barriers

Q15. For each of the types of measure listed below, please indicate the extent of the legal constraints on your ability to implement or modify measures. The summary gives examples of legal constraints.

Measure	major constraint	minor constraint	no constraint
Land-use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Road building	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public transport infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traffic management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bus and rail operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information provision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pricing measures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Financial barriers

Q16. For each type of measures listed below, please indicate the extent of the financial constraints on your ability to implement or modify measures.

Measure	major constraint	minor constraint	no constraint
Land-use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Road building	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public transport infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traffic management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bus and rail operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information provision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pricing measures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Acceptability constraints

Q17. For each type of measures listed below, please indicate the extent of the acceptability constraints on your ability to implement or modify measures.

Measure	major constraint	minor constraint	no constraint
Land-use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Road building	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public transport infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traffic management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bus and rail operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information provision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pricing measures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q18. Are there other significant constraints which limit your ability to implement any of the types of measure listed?

Yes No

If yes, please describe briefly

F. FINALLY ...

Q19. Considering all of the issues covered above, please describe briefly what you consider to have been the most significant changes in policies and policy-making in your city over the last decade

Q20. Considering all of the issues covered above, please describe briefly what you think are likely to be the most significant changes in policies and policy-making in your city over the next decade. Please also indicate how probable it is that they will occur.

Thank you for taking the time to fill in this questionnaire. Please return it by October 20th to:

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