Urban Transport Benchmarking Initiative

Year one final report

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Transport & Travel Research Ltd

THE REGIONAL ENVIRONMENTAL CENTER for Central and Eastern Europe

The Urban Transport Benchmarking Initiative

Year one final report

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by

Author(s)	Neil Taylor and Sarah Clifford
Quality Control	Jo Baker
Project Manager	Jo Baker
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0. EXECUTIVE SUMMARY

This document is the summary report of the first year of the Urban Transport Benchmarking Initiative. The report provides an overview of the activities undertaken as part of the project and also summarises the headline results from the benchmarking process. This document is supported by full reports of each of the five working groups and the findings from the common indicators.

Immediately following the launch of the project in November 2003 the five themed working groups were established covering; Behavioural and Social Issues in Public Transport, City Logistics, Cycling, Demand Management and Public Transport Organisation and Policy. Each of the working groups attended three site visits (with the exception of the cycling working group which only had time for two visits) to the following cities; Valencia, Lyon, Copenhagen, Oulu, Helsinki, Dublin, Barcelona, Rotterdam, Liverpool, Aalborg, London, Rome and Bristol. These site visits were used partially to enable meeting time for the working groups in which the participants discussed progress in the benchmarking process and planned the next phases of development.

29 urban transport organisations were represented in the initiative and the participating cities collected data relating to 25 common indicators and a range of thematic indicators, which had been selected by the cities. The data analysis and presentation was carried out by the rapporteurs and experts in consultation with the working group participants.

The detailed findings of the common indicator analysis are included in the common indicator report in Annex A1.2. However, in brief, statistical analyses of the common indicator data identified the following three key trends in the urban transport systems in each of the participating cities and regions;

Urban metro systems - Cities with large populations are those most likely to have extensive metro systems. A suggested threshold for metro provision is 40km of metro network per 1 million inhabitants. Using this threshold Dublin and Warsaw could be considered as potential metro cities.

Urban cycling and the impact of investment in cycling infrastructure - Wealthier cities are those most likely to have larger cycle path networks. Those cities with large cycle path networks in relation to the total road network are also likely to display a high level of cycling modal share.

The influence of GDP per capita upon urban transport modal share - Affluent cities have greater levels of car use than less affluent cities. There is a negative statistical relationship between public transport modal share and GDP per capita, which suggests that as GDP per capita increases people's propensity to use public transport decreases.

The findings of the analysis of the thematic indicators for each working group are available in the working group reports in Annexes A2 to A6 but are also summarised below;

The following research question was developed by the City Logistics group; ***"How can cities, operators and customers work together towards improving the collective transport of goods?"*** The following conclusions and recommendations were drawn from the data analysis;

- The most interesting scheme visited by the group was the freight consolidation centre established in Bristol to enable the efficient movement of freight to retailers in the city centre. This is an exciting planned development which is being pioneered in Bristol and has never before been attempted in an Urban City Area. As a result all of the participating cities were

excited by the potential of this scheme and further research could focus upon its transferability to other cities seeking a solution to freight congestion in the city centre.

- Aalborg also displayed a range of interesting practices, which involve a much smaller financial, and infrastructure outlay, but which appear to be highly effective. The city of Aalborg created a forum ("Beer and Sandwich Evening") which enabled delivery drivers who operated in the city centre to meet and discuss their operations. Aalborg City also circulated a pamphlet with a drivers' code of conduct and map showing the recommended delivery routes of the city centre. Both of these are cost effective, simple measures to implement which have greatly improved communication and flexibility in the delivery of goods within the city centre. These ideas could be readily transferred to other cities seeking to establish better lines of communication among urban logistics stakeholders and have the added attraction of requiring only modest financial outlay.

The cycling working group pursued two research questions: ***"To what extent has cycling become mainstreamed in each city as far as both policy and practise is concerned?"*** and ***"What part have infrastructure and marketing played in achieving current levels of cycle usage, and what part is it expected they will play in the future?"***

The following conclusions and recommendations were drawn from the analysis of the thematic indicators and working group visits:

- Cities in the cycling group were interested in developing a similar tool to the Copenhagen 'Bicycle Account'. The 'Bicycle Account' document is published every two years and asks key quantitative questions such as the number of kilometres cycled per day and the number of cycling casualties. Qualitative information is also obtained from carrying out interviews with cyclists to establish their opinion of current provision.

- Lessons learned in Lyon have promoted the need to include cycling measures more prominently in recreational developments. By integrating cyclists with walkers and other activities, this not only improves the feeling of spaces for all but encourages people to spend more time outdoors with respective improvements in their health and well-being.

The following research question was developed by the Behavioural and Social Issues in Public Transport working group; ***"How can we influence travel behaviour in order to increase the market share of public transport and retain existing customers?"*** The following interesting conclusions can be drawn from the analysis of the data;

- Paris appears to lead the way in terms of the amount of integrated public transport information that is currently available and the fact that it can all be accessed via the internet. Paris and the Ile de France region set the benchmark by being the only city / region to operate an online journey planning facility. In addition, all public transport information in Paris and the Ile de France is integrated, which reflects the fact that RATP and STIF have close links and RATP also operates the bulk of the public transport services in the city.

- The level of real time information available in Paris is also more substantial than in other cities in the working group. The media is still in its infancy, although in Paris the newly built tramway system was designed to have real time information, while the RER has recently been retro-fitted. As a result these modes have 100% coverage of real time information, whereas it is not yet available in Athens.

- An annual survey of customer satisfaction appears to be virtually a standard within the working group. The most common method of interviewing people is by telephone, although in Bucharest (and Rotterdam and Helsinki from site visits) face to face interviews are also used. RATP (Paris) were the only organisation to conduct an interim survey on a more regular, quarterly basis. In addition Paris is the only city where complaints are handled using e-mail, which enables faster handling and explains the shorter response time to complaints.

- Partnerships to promote the use of public transport were only evident in Paris (Euro Disney) whereby combined tickets (transport and park entry) are combined to offer better value to people travelling from central Paris to Marne La Vallée. In Rotterdam innovative use of advertising space (on modes of transport and in free "Metro" publications) enabled RET to barter deals with traffic generators (Pathé cinema & Feyenoord Football Club) where advertising space was given free in return for the supply of discounted entry tickets to attractions.

- Concessions for particular social groups are commonplace among the working group's cities but, as the example of Athens reveals, simply making public transport cheaper through a discount does not guarantee greater patronage. In Paris and in the Emilia Romagna region considerable effort has been channelled into making public transport an appealing option for young people as well as offering concessions. This has been achieved through the use of dedicated information and websites aimed specifically at young people.

The Public Transport Organisation and Policy working group compared public transport performance between participants, using benchmarks for the quality of service (volume of supply, average age of vehicles, average frequency of vehicles, availability of services and punctuality), the level of patronage and finances. The following good practices were identified;

Volume of supply and average age of vehicles;

- The maximum age of buses are specified in the contract with the authority.
- The age of buses is taken into account in payment from authority (e.g.: Alicante)
- There was good integration with other measures for example in Dublin as part of the Quality Bus Corridor improvements.

Frequency;

- One of the key elements of the Quality Bus Corridors scheme implemented in Dublin is the provision of high frequency bus services. At peak times, there is one bus every minute on strategic routes.

Accessibility

- In order to increase accessibility of the bus fleet, contractual provisions can be used to encourage renewal of the bus fleet with new low floor buses (e.g.: Alicante).
- Legal provisions can ensure accessibility to public transport (e.g.: The law requires Metro stations to be 100% accessible to PRM (people with reduced mobility) in the Netherlands)

Ticket and fare integration

- Coordination with and between public transport authorities at various levels
- Development of electronic ticketing

The Demand Management working group site visits to Barcelona, London and Oulu, highlighted some interesting practices;

- In Barcelona, the group saw a new tram system which had been implemented without any integration with private modes (such as park and ride) but as an urban public transport system designed to be easy to access by walking. One key advantage of the tramway is that it is at street level and is easier to access for "short hop" journeys than the metro system where escalators and underground walkways must be used. Barcelona also provided an interesting example of how restriction of road space can revitalise shopping and tourist areas and can be a popular measure once initial opposition is overcome.

- The example of Oulu also challenged traditional logic regarding reasons to travel by bicycle in a city. High levels of cycling are usually associated with a high density city and a temperate climate, but in Oulu the city is fairly low density and the climate is especially harsh during the winter. Yet the city boasts the highest modal share for cycling amongst the working group participants thanks to an investment in cycle routes and storage facilities and the development of a cycle-friendly culture.

One of the wider aims of the Urban Transport Benchmarking Initiative has been to try and link the findings of the project to urban transport policy and suggest some factors that may have an impact upon these policies. Although data has only been collected for one year, the following potential policy implications have emerged from the findings of year one:

- **Average wealth (in terms of GDP per capita) has a subtle influence upon urban transport and the modal choices of the inhabitants of a city** - The common indicator analysis revealed that in affluent cities it is common for there to be a tendency towards higher levels of car use and lower levels of public transport use. The common indicator results also demonstrated a strong positive relationship between GDP per capita and the provision of cycling infrastructure, which in turn resulted in higher cycling modal shares.

- **Cities with populations in excess of 1 million inhabitants can be considered as potential metro cities - As** demonstrated by the common indicators, the size of the population of a city has a strong bearing upon the feasibility of constructing a metro system. For the metro-cities involved in the Urban Transport Benchmarking Initiative, the average ratio was 40 km of metro network per 1 million inhabitants. In the case of the cities involved in the benchmarking initiative, Dublin and Warsaw emerged as potential metro-cities based on this threshold.

- **Demonstrating market awareness makes it possible to target public transport user-groups and appeal to their needs** - The behavioural and social issues in public transport working group established that where the public transport marketing effort of cities was strategically organised to target particular age / user–groups it was possible to offer specifically tailored products and services to passengers. The city of Paris provided several good examples of how customer satisfaction surveying and market research activities focused very narrowly upon specific public transport user groups. Although no direct link could be established, Paris also displayed the highest level of public transport modal share of all of the cities that participated in the working group. In Paris public transport ticket offers, such as concessions for young people and links with Euro Disney were planned so that passengers were offered more than "a young person's travel discount card". Focusing upon "Imagin'R", the young person's travel card in Paris, the main offer of reduced travel was supported by a dedicated website and links to other

related products which were designed to appeal to young people. This finding emphasised the need for public transport operators and authorities to be aware of the purpose of customer satisfaction surveying, rather than simply undertaking an annual survey without any clear strategic goals.

- **Using the concept of the "Target Area" helps cities to understand and improve the efficiency of freight flows in the urban environment. -** The concept of the target area developed by the city logistics working group has the potential to be adopted by other cities seeking to improve their management of urban freight.

- **An integrated approach to promoting cycling as a means of sustainable transport is far more successful than a set of isolated measures. -** The studies of the cycling working group indicated that the implementation of a range of measures to promote and improve local cycling conditions is a requirement for cities seeking to develop a local cycling culture. The two key barriers to improving the viability and increasing the uptake of cycling were the development of cycling infrastructure (paths, tracks and signed networks) and the provision of parking facilities for bicycles. In all cities in the group the amount of bicycle parking was deemed to be insufficient. The majority of the participants in the group are trying to address this need with the inclusion of bicycle parking in the planning process.

  The key policy implication arising from the research is that a city which is working to encourage cycling should aim to develop an approach which does not focus solely upon one type of scheme. The measures applied in the cities in the group have been most successful where a range of schemes have been combined and applied in an integrated manner.

- **Parking policies linked to development and public transport are important goals for cities seeking to reduce car use in the urban centre. -** The demand management working group identified that limiting parking spaces for new developments was an important demand management tool, which was used by 5 of the 7 cities participating in the group. Parking policies have a dual impact because they can be used to reduce the number of parking spaces available at new developments, thus encouraging residents / employees to seek alternative modes of transport to the car.

1. INTRODUCTION

1.1 Project background

The Urban Transport Benchmarking Initiative has sought to apply the concept of benchmarking to the urban transport systems present in cities across the EU, including the New Member States. This is in keeping with the European Union's policy approach which places considerable importance upon the role that attractive, efficient local and regional transport systems can play in the economic development and social cohesion of the EU. In the field of urban transport the exchange and promotion of best practices is one of the main policy tools that the European Commission possesses. The Urban Transport Benchmarking initiative has therefore compared the differences between the transport systems of participating cities in order to identify and promote interesting practices in urban transport.

The benchmarking concept has great potential when applied to urban transport systems. A range of previous initiatives have provided this project with the opportunity to deepen the focus of the benchmarking process and, by learning from previous experiences, provide more comparable results. The development of more practical data indicators has aided the learning process for the organisations involved in the project and this has greatly helped to improve the robustness of the data collected for the project.

The Urban Transport Benchmarking Initiative has adhered to the European Commission's subsidiarity principle by including as many urban transport stakeholders as possible. The process of the Urban Transport Benchmarking Initiative has been a fluid one, responding to the issues which were raised by participants in the project, rather than following a rigid, predetermined process. In this way the subsidiarity principle has been fulfilled, because the recommendations of interesting practices are coming from a network of urban transport operators, user groups, local authorities and municipalities, rather than a single centralised institution. It is therefore hoped that the project's findings will provide a useful resource for other urban transport stakeholders and help them to implement innovative solutions to commonly experienced urban transport problems.

The Urban Transport Benchmarking Initiative has been based around five themes, for which data has being collected by the participating cities. These themes have been organised as working groups and these are listed below:

- Behavioural and Social Issues in Public Transport
- City Logistics
- Cycling
- Demand Management
- Public Transport Organisation and Policy

The working group themes have been chosen by the participating cities to reflect their interests in terms of urban transport systems in cities. The participating cities have also been responsible for helping to select common data indicators, that have been used to benchmark general aspects of urban transport, and thematic indicators, that have been collected by cities within each of the five themed working groups. The thematic indicators are specific to each working group and aim to answer the chosen research questions. The participants have been aided with the definition and analysis of thematic indicators by their working group rapporteur and expert.

This document is the summary report of the first year of the Urban Transport Benchmarking Initiative. The report provides an overview of the activities undertaken as part of the project and also summarises the headline results from the benchmarking process. This document is supported by full reports of each of the five working groups and the findings from the common indicators.

1.2 The benchmarking concept

The concept of benchmarking has been used widely by many different types of organisation seeking to learn more about their operational shortcomings. The process of benchmarking involves comparing operational performance with similar institutions, organisations or enterprises in order to gain some understanding of the best practices employed within a given industry. Once performance differences across an industry are understood then each participating organisation has the potential to integrate best practices within the scope of its own operations in order to attain measurable performance improvements.

Successful Benchmarking =
Self Analysis + Identify Best Practices + Analyse Performance Differences + Implement Findings
Result = Narrowed Performance Gaps & Tangible Performance Improvements

The benchmarking process is usually centred upon performance indicators, which operate as a means of self analysis and help to identify key differences between participating organisations. The participants of a benchmarking exercise will collect data for these indicators in order to establish best practices in a particular field. Site visits or case studies are often used to showcase best practices, because this helps participants to understand more fully how the best practices have been developed and how they work on a daily basis.

Once benchmarks have been established it is the responsibility of individual participants to return to their respective organisations and implement the process changes that should improve performance levels. This requires a commitment from participants that the organisation is willing to co-operate not just in the process of benchmarking, but in following up the recommendations in order to implement change. This is not simply a case of "following the leader", but of constructively integrating the best practices that leading organisations have established into existing procedures.

In the case of the Urban Transport Benchmarking Initiative the actors participating in the benchmarking exercise have been urban transport stakeholders. This included a range of organisations such as municipal authorities, public transport operators, and regional authorities. It is intended that the organisations representing each of the participating cities will disseminate relevant results to other local transport stakeholders.

1.3 Learning from previous initiatives

The Urban Transport Benchmarking Initiative has built upon the experience of the two previous Citizen's Network Benchmarking Initiatives which together ran from 1998 until 2002. There have been many other transport benchmarking projects and the aim of this initiative has been to learn from the experiences of previous transport benchmarking projects. A detailed review of previous initiatives, including the Citizens' Network Benchmarking Initiative, is detailed in Annex A1.2.

1.4 Objectives of the Urban Transport Benchmarking Initiative

The key objectives of the Urban Transport Benchmarking Initiative were:

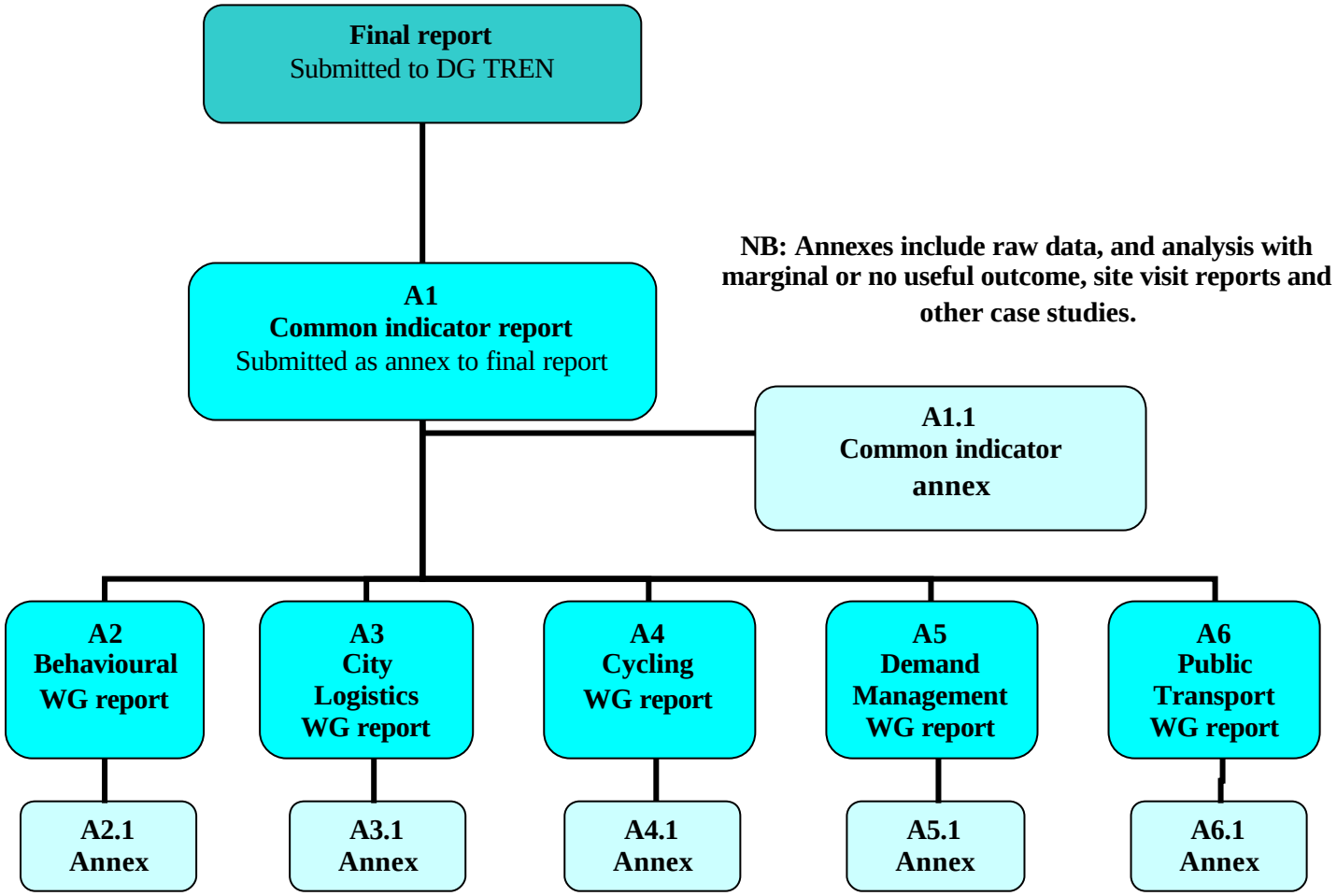
1. To select annually a group of participants representing local and regional urban transport stakeholders from 35-40 cities.
2. To agree a set of common performance indicators covering urban passenger and freight transport.
3. To undertake a comparative analysis across stakeholders.
4. To set up a maximum of 5 thematic working groups on topics agreed by the participants.
5. To organise site visits (3 per year) for the working groups through which to identify and study best practices.
6. To disseminate the results.

These objectives were largely achieved and a review of the achievements of year one of the Urban Transport Benchmarking Initiative is presented in the concluding section of this report.

1.5 Purpose and context of this report

This document represents the summary report of the first year of the Urban Transport Benchmarking Initiative. The document outlines the organisation of the project and summarises the findings of the project. This document is supported by a range of annexes (detailed in Figure 1.1), containing the reports that have been produced for each of the five working groups and for the common indicators.

Figure 1.1: Reporting structure for the Urban Transport Benchmarking Initiative



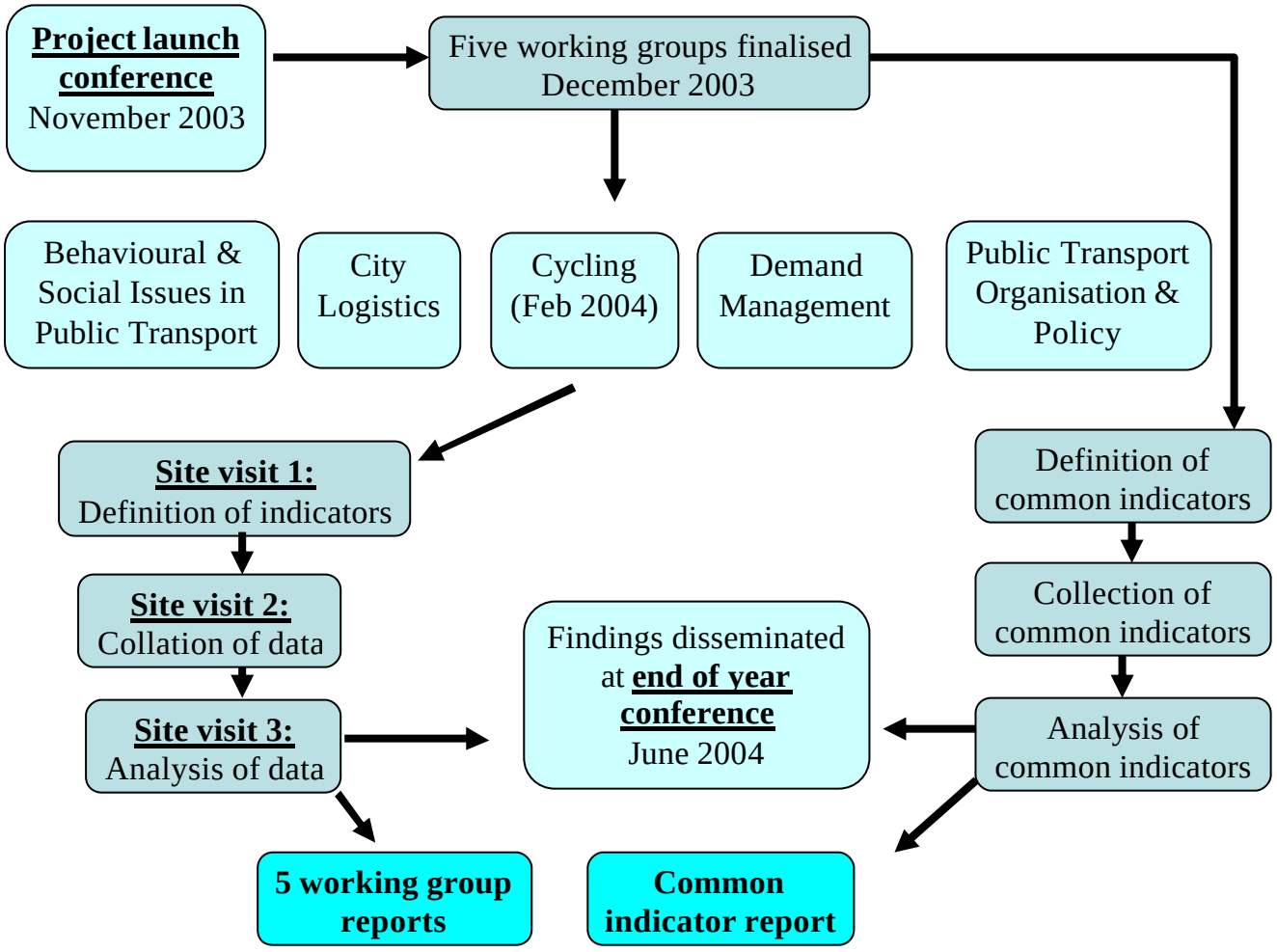
The remainder of this report includes an overview of the cities and regions that have participated in the Urban Transport Benchmarking Initiative (section 2). Section 3 of the report outlines key statistics and trends identified from the analysis of the common indicators. Section 4 summarises the findings of the 5 working groups which have focused upon different urban transport-related themes. The final section of the report outlines the conclusions from the first year of the Urban Transport Benchmarking Initiative and makes recommendations for the development of the project into year two. A series of suggested next steps for the project are also included in section 5 of this report.

2. ORGANISATION, PARTICIPANTS AND SITE VISITS

2.1 Project Organisation

The Urban Transport Benchmarking Initiative was launched formally in November 2003 and the benchmarking activity took place until June 2004, when the results of the first year of the project were disseminated at the end of year conference. Figure 2.1 (below) outlines graphically how the project has progressed over the course of the first year:

Figure 2.1: Year one of the Urban Transport Benchmarking Initiative



Immediately following the launch of the project in November 2003 the five themed working groups were established. It was planned initially that one working group would focus specifically upon the theme of energy and environment in the context of urban transport. The limited amount of interest in this topic meant that the cycling working group was set up instead and was formally established in February 2004. In the limited time available, the cycling working group has been able to make very good progress, performing a benchmarking exercise and developing a group of cities keen to further their research into year two of the initiative. In similar circumstances the behavioural and social issues in public transport working group was originally intended to focus solely upon the theme of behavioural measures. The lack of initial interest in this theme resulted in the shift of emphasis towards the impact that behavioural issues have upon public transport.

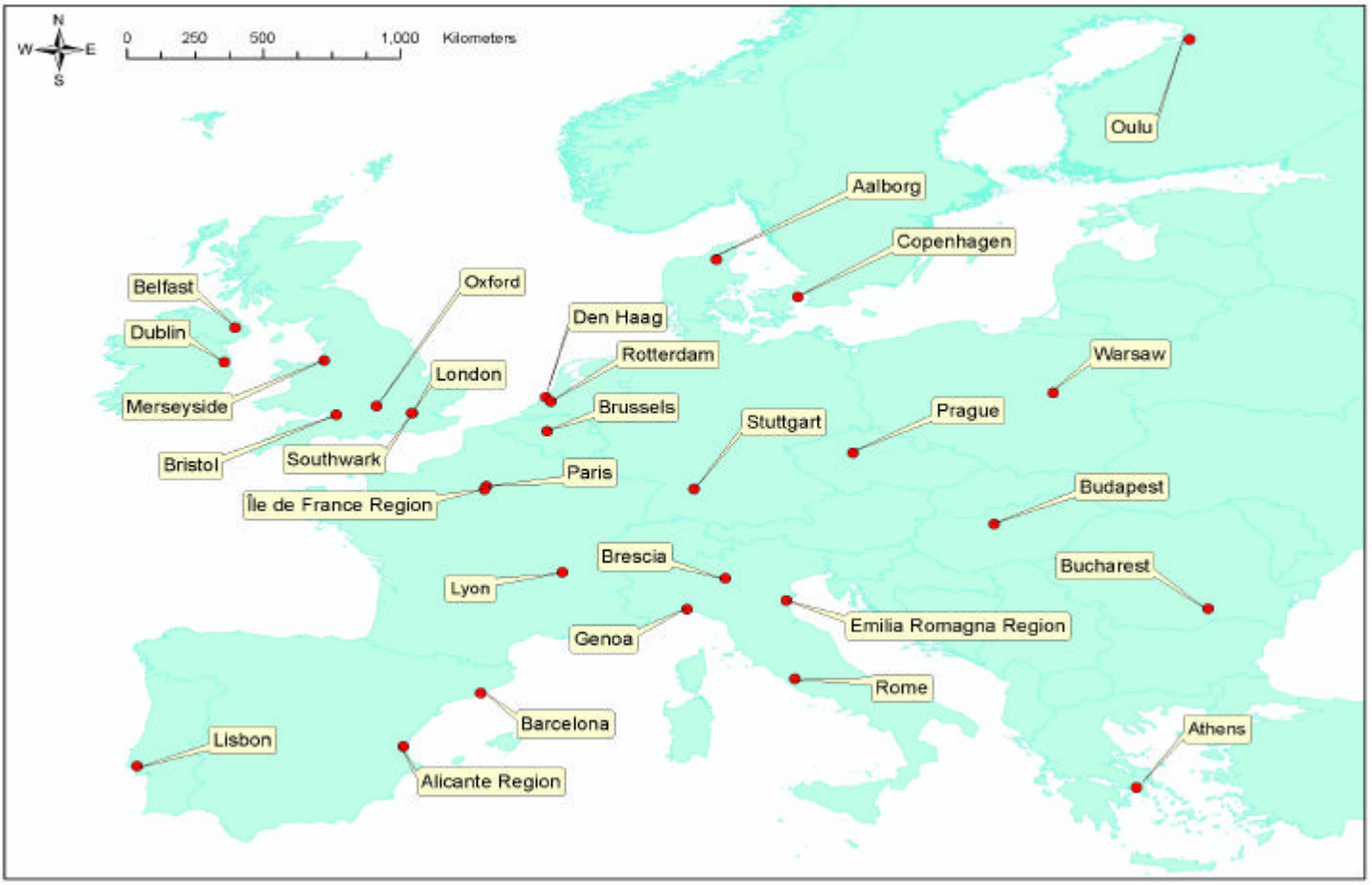
Each of the working groups attended a total of 3 site visits (with the exception of the cycling working group which only had time for 2 visits). These site visits were used partially to enable meeting time for the working groups in which the participants discussed progress in the benchmarking process and planned the next phases of development. In addition the site visits offered participants the opportunity to gain first-hand experience of interesting practice in different locations across Europe. This was identified by the Citizens' Network Benchmarking Initiative as one of the most valuable aspect of the previous initiative and has also proved to be important for participants in the Urban Transport Benchmarking Initiative.

Once the working groups had advanced through the process of data collection and analysis the rapporteurs from each working group were responsible for producing an end of year report, with the help of the participants in the group. The key findings from year one of the project were disseminated at the end of year conference which took place in June 2004 and, as illustrated in Figure 1.1, the working group reports are annexed to this report.

2.2 Participating cities and regions

In total 26 different cities collected common indicator data for the Urban Transport Benchmarking Initiative, although a total of 29 urban transport organisations have been represented in the project. Not all of the cities were able to submit common indicators due to pressures on time and resources, but the majority of organisations that have participated in the Urban Transport Benchmarking Initiative have submitted both common and thematic data. Figure 2.2 shows the large geographic spread of participants involved in the Urban Transport Benchmarking Initiative.

Figure 2.2: Cities participating in the Urban Transport Benchmarking Initiative



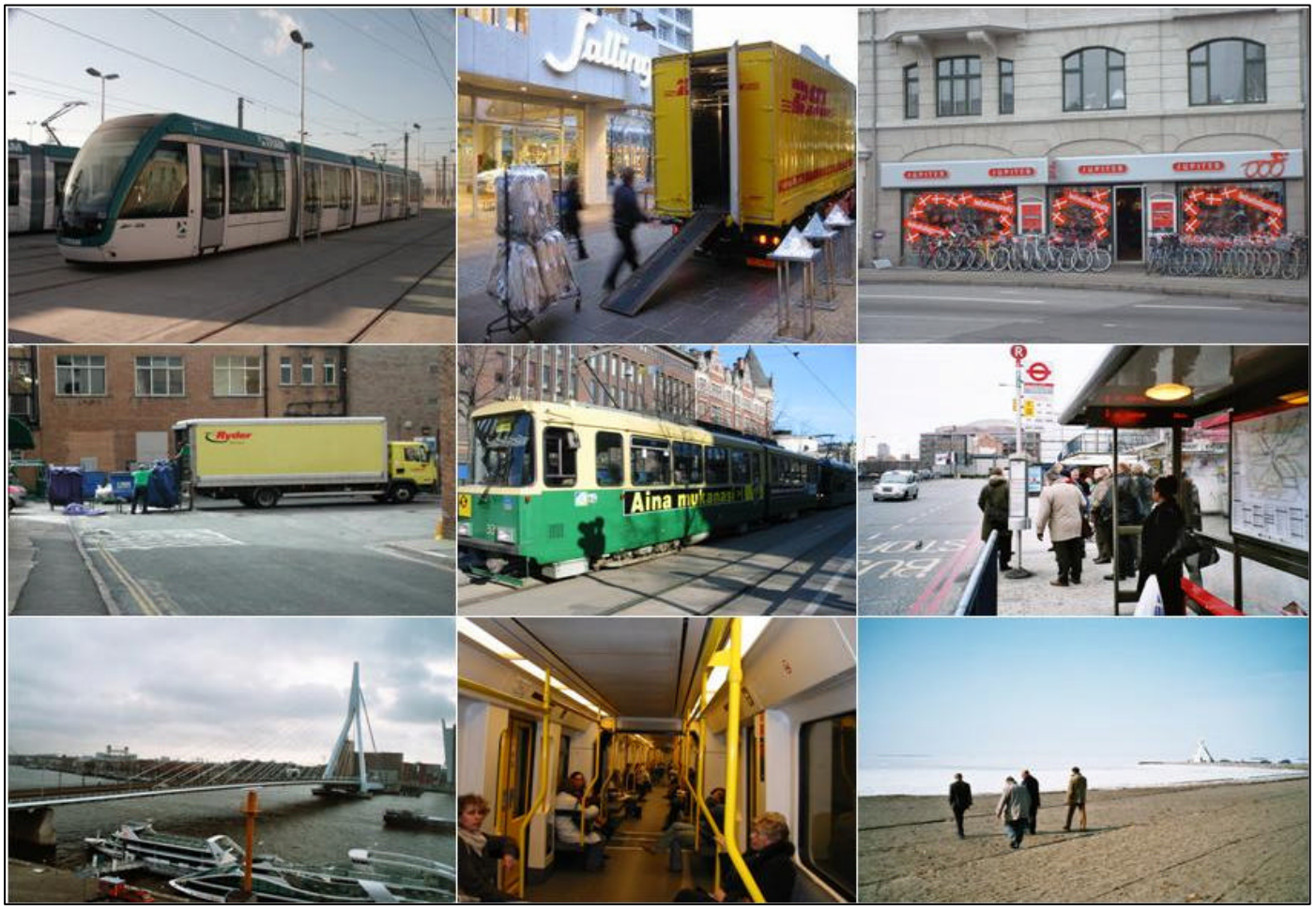
2.3 Project site visits

During the course of year one of the Urban Transport Benchmarking Initiative a total of 13 different cities have been visited by the working groups including:

- Valencia
- Oulu
- Barcelona
- Aalborg
- Bristol
- Lyon
- Helsinki
- Rotterdam
- London
- Copenhagen
- Dublin
- Liverpool
- Rome

These site visits are described in full in the working group Annexes (A2.2 through to A6.2) and are also available on the Urban Transport Benchmarking Initiative website at: http://www.transportbenchmarks.org/events/site-visits.html. Figure 2.3, below highlights some of images from the cities visited over the course of year 1.

Figure 2.3: Cities visited by the working groups



Cities pictured are: Top left to right; Barcelona, Aalborg, Copenhagen, Middle left to right; Bristol, Helsinki, London, Bottom left to right; Rotterdam, Valencia and Oulu

3. THE COMMON INDICATORS

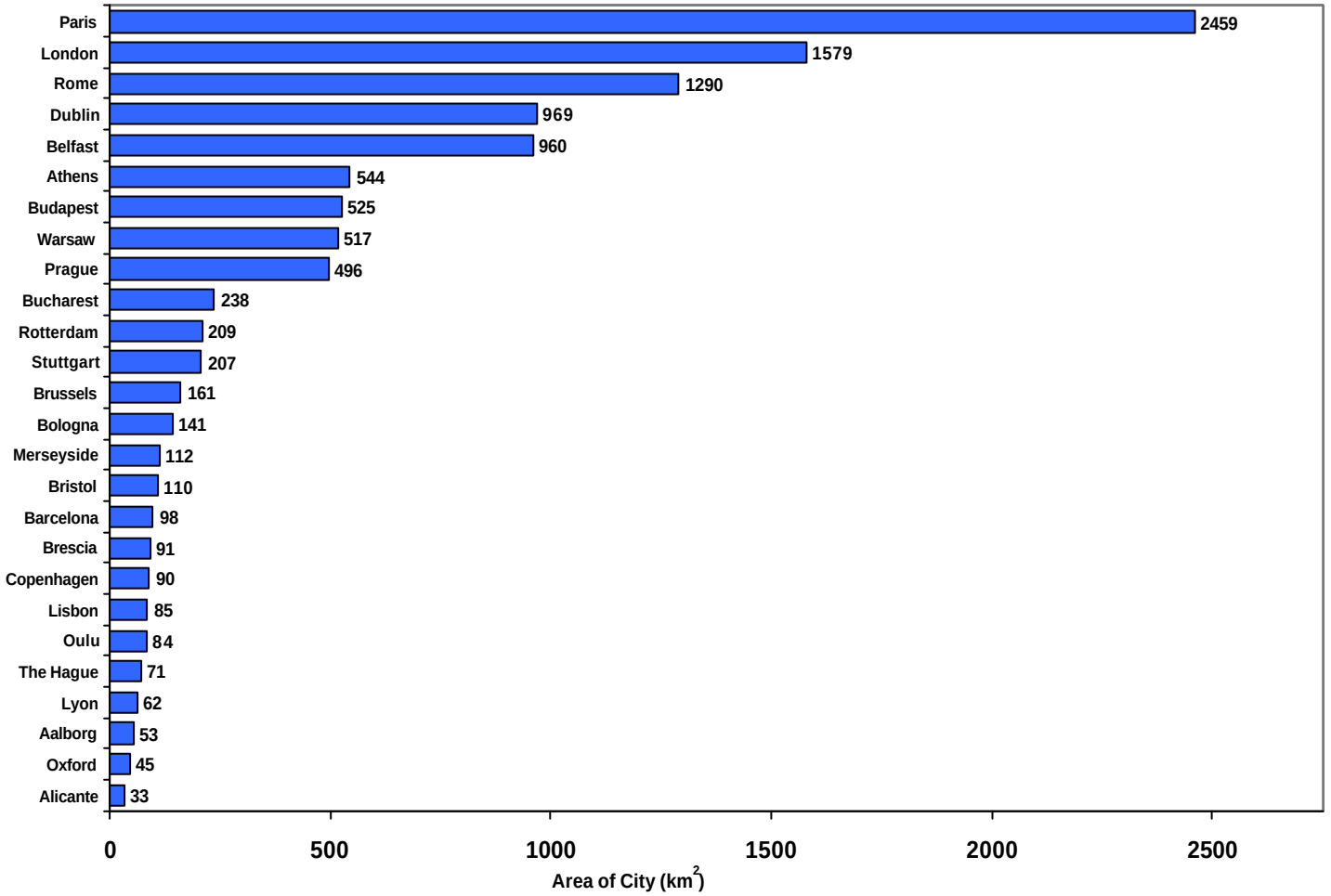
This section of the summary report outlines the background statistics and key findings and is drawn from the common indicator report (Annex A1 and A1.2). The common indicator report fully

describes the process of indicator selection, data collection and data analysis. In addition a full list of the common indicators collected and graphs for all raw data are included in this annex.

3.1 Background statistics

The following graphs offer useful context for further comparisons between the participating cities and regions in the Urban Transport Benchmarking Initiative. Figures 3.1 to 3.5 provide five key statistics for each of the cities and regions that submitted common indicator data.

Figure 3.1: Surface area of cities



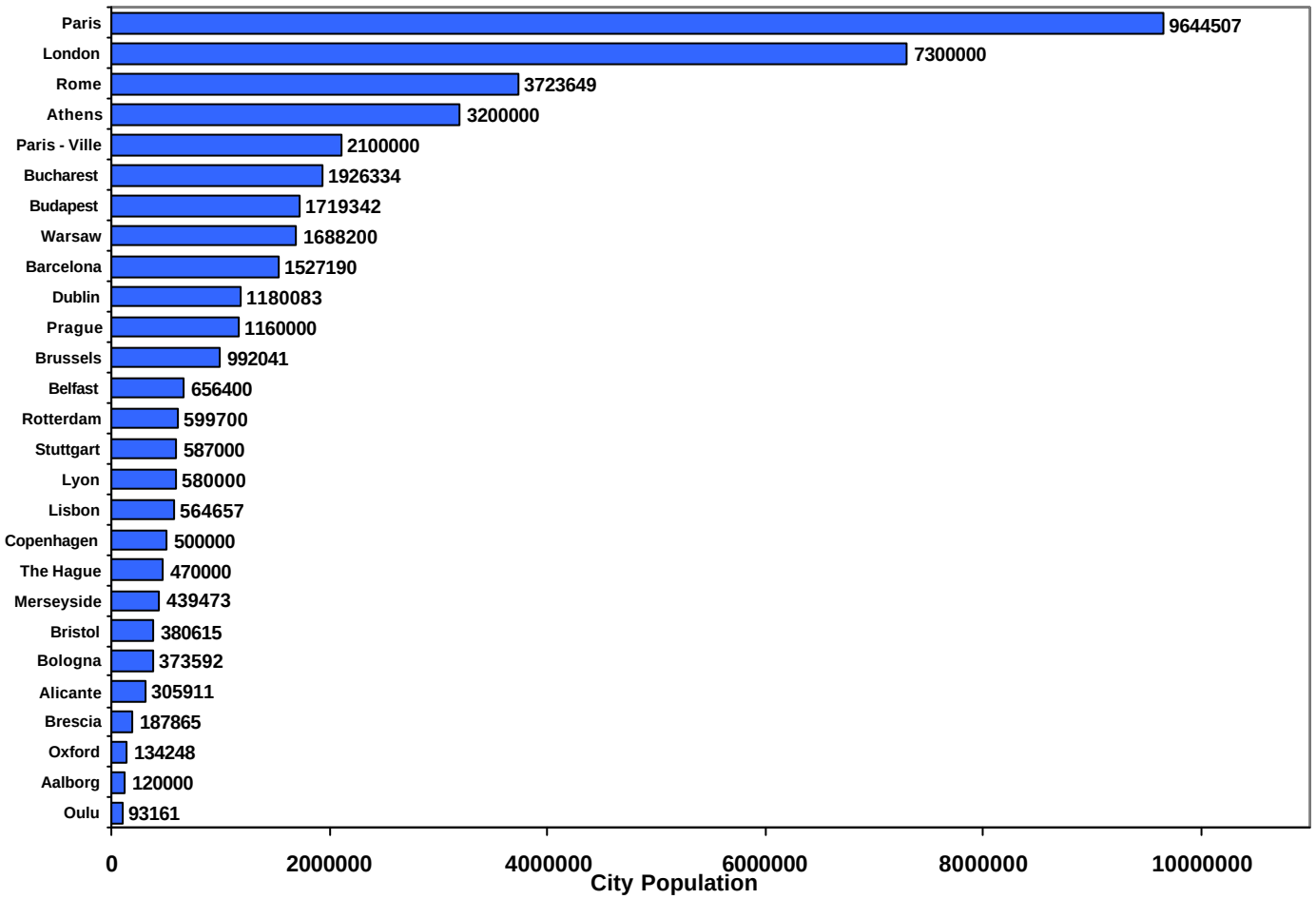
Key data issues:

- All data relates to 2002.
- Data for Rotterdam refers to the municipality of Rotterdam.
- Data for Paris refers to the built-up area and not the entire Ile de France region.
- Data for London relates to the Greater London area.
- Data for Rome refers to the built-up area and not the surrounding metropolitan area.
- Data for Dublin refers to the Dublin Metropolitan area.
- Data for Merseyside refers to the City of Liverpool.
- Data for Barcelona refers only to the city.

Figure 3.1 illustrates the variety of cities involved in the benchmarking initiative. The cities range in size from Alicante, the smallest city in the initiative with a surface area of 33km^2, to Paris which covers an area of 2,459km^2. Paris is the largest city participating in the Urban Transport Benchmarking Initiative and, along with Greater London and Rome, is one of only 3 cities participating in the initiative with a built-up area which exceeds 1000km^2. The average size of cities participating in the benchmarking initiative is 448km^2, although this declines to 264km^2 if the values for Rome, Paris and Greater London are excluded from the calculation.

Paris also displays the largest population, with 9.64 million inhabitants, among the benchmarking cities (see Figure 3.2). London is the second most populous city with 7.3 million inhabitants followed by Rome and Athens. The smallest city in terms of size of population is Oulu, which has a population of just over 93,000. Figures 3.1 and 3.2 emphasise the wide range of cities that have participated in the Urban Transport Benchmarking Initiative.

Figure 3.2: Population of cities

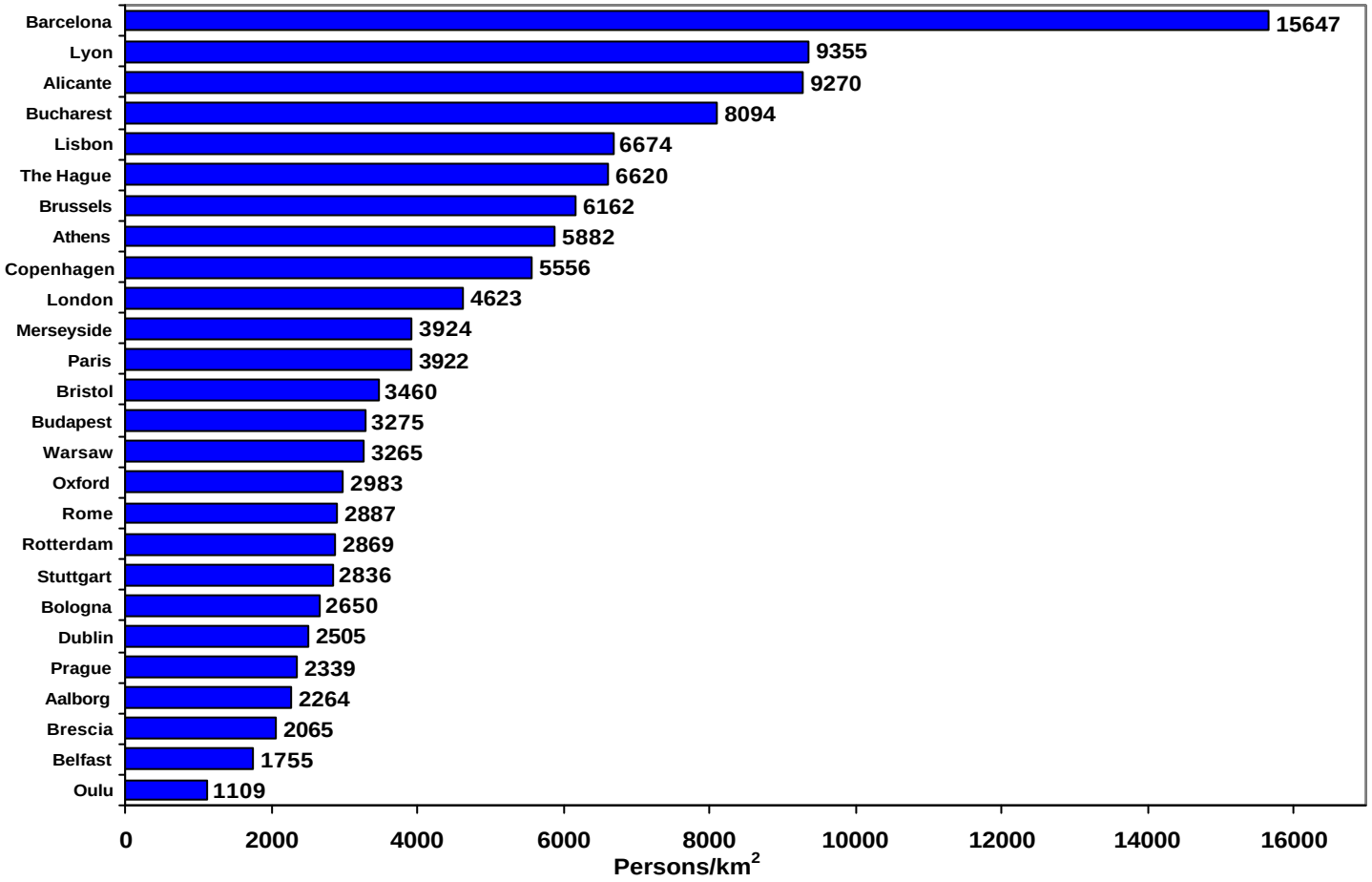


Key data issues:

- All data refers to 2002, except for Belfast (2000) and Athens, Bristol, Lisbon, Merseyside and Oxford (2001).
- Data for Rotterdam refers to the municipality of Rotterdam.
- Data for Paris refers to the built-up area and not the entire Ile de France region.
- Data for London relates to the Greater London area.
- Data for Rome refers to the built-up area and not the surrounding metropolitan area.
- Data for Dublin refers to the Dublin Metropolitan area.
- Data for Merseyside refers to the City of Liverpool.

- Data for Barcelona refers only to the city.

Figure 3.3: Population density of cities and regions



Key data issues:

- All data refers to 2002, except for Belfast (2000) and Athens, Bristol, Budapest, Lisbon, Merseyside and Oxford (2001).
- Data for Rotterdam refers to the municipality of Rotterdam.
- Data for Paris refers to the built-up area and not the entire Ile de France region. In Paris Ville (the urban centre of the city) the population density exceeds 24,000 people / km^2.
- Data for London relates to the Greater London area.
- Data for Rome refers to the built-up area and not the surrounding metropolitan area.
- Data for Dublin relates to the urbanised area of Dublin's District Electoral Divisions (DEDs). The built up aspect of these covers an area of 433 km^2 and are home to 1.084 million inhabitants. The Dublin Metropolitan area has a population density of 1219 people per km^2
- Data for Merseyside refers to the City of Liverpool.
- Data for Barcelona refers only to the city, which is completely urbanised.

Figure 3.3 shows the population densities of the benchmarking cities, expressed as the number of persons per square kilometre. The least densely populated city is Oulu, with just 1109 people / km^2. Barcelona is the most densely populated city which, with 15,647 people per km^2, is almost four

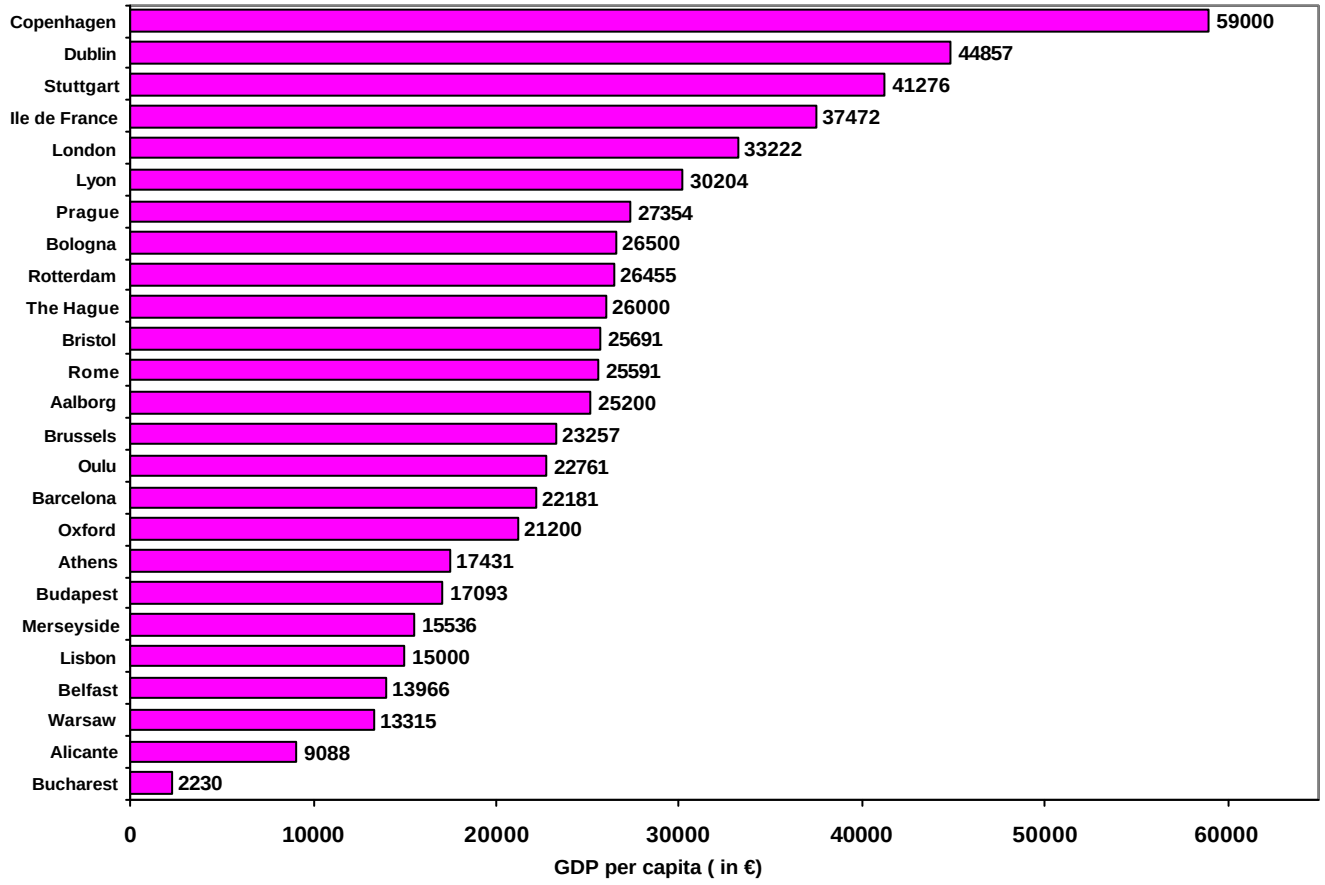
times denser than the average population density for all other cities (4,275 people / km^2).
The figures for Barcelona are so large, because the data submitted accounts only for the central area of the city and the population of this area.

The central area of Paris is very dense (approximately 24,500 people / km^2) which differs greatly from the figure of 3,922 people per km^2 for the urbanised area and even more so from the figure for the Ile de France region where there are 918 people per km^2. In the case of Rotterdam the population of the RET public transport area is 909,000 and the surface area is 31.1 km2, which is the equivalent of a population density of 29,228 people per square kilometre. This is also a much higher figure than that for the municipality of Rotterdam (2,869 people/km^2), which is displayed in Figure 3.3.

These examples demonstrate how difficult it is to de-limit city area in order to make salient comparisons, particularly with very large cities such as Paris, London, Rome and Barcelona. As a result it is difficult to use population density as the basis for any accurate analyses

Figure 3.4 displays the GDP per capita values for the cities taking part in the Benchmarking initiative. Large differences exist in the levels of GDP per capita, most notably between Copenhagen, the city with the largest GDP per capita (€59,000), and Bucharest, the city with the smallest (€2,230). The average GDP per capita of all of the cities participating in the Urban Transport Benchmarking Initiative is €25,425.

Figure 3.4: GDP per capita of cities and regions



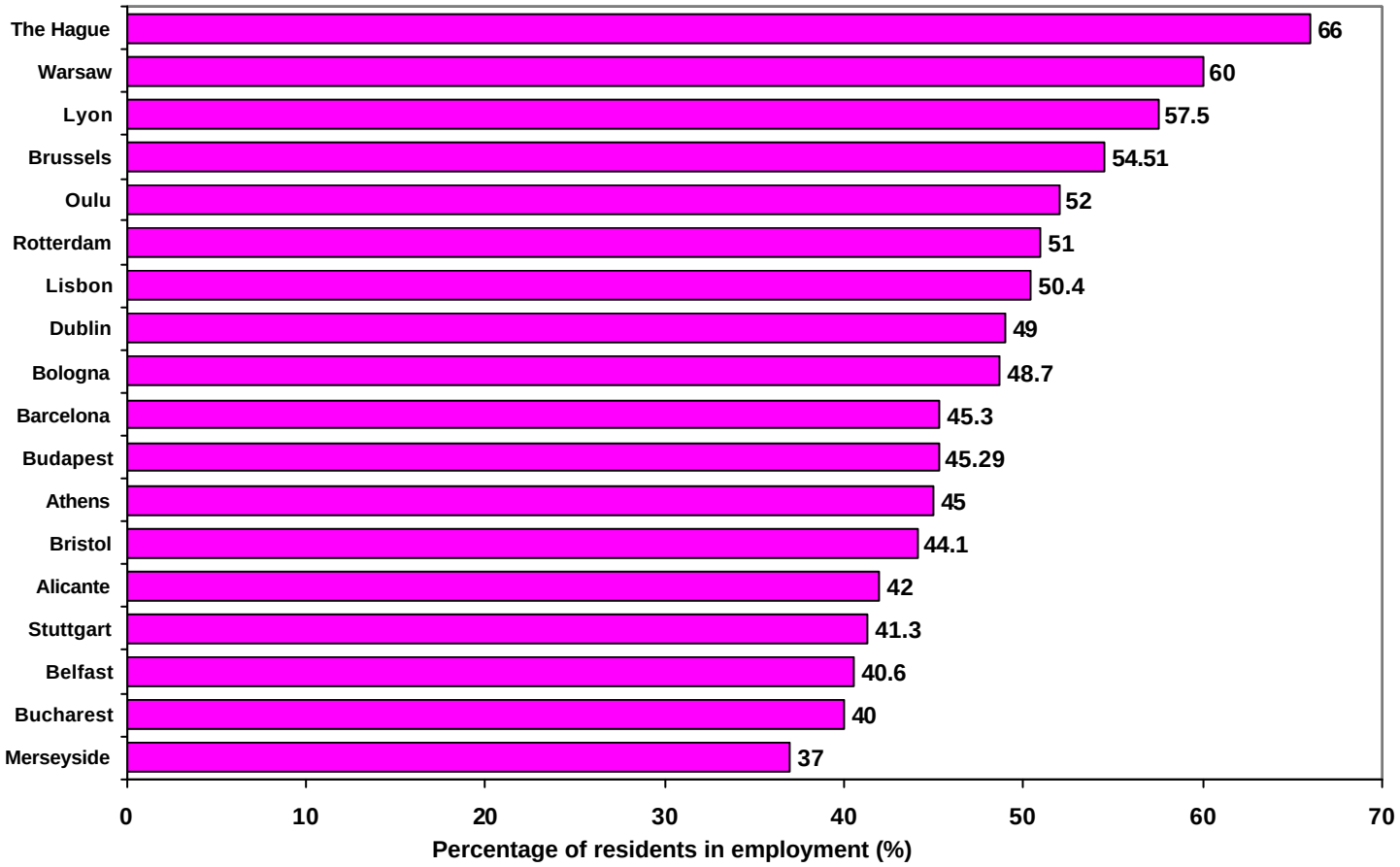
Key data issues:

- All data refers to 2002, except for Belfast (1997), Lisbon & Brussels (2000) and Barcelona, Bologna, Budapest, Copenhagen, Merseyside, Oxford and Rotterdam (2001).
- Data for Lyon refers to the Rhone region.
- No data was supplied by Brescia.

Figure 3.5 illustrates the different levels of employment among resident populations in each of the urban administrative areas. Not all cities have been able to provide these figures due to differences in statistical collection of data, so some cities which displayed very high proportions of employment (Prague, Aalborg, the Ile de France region and Copenhagen) are not displayed in Figure 3.5.

The Hague (66%) and Warsaw (60%) display the highest levels of residential employment of the cities that have participated in the Urban Transport Benchmarking Initiative. Merseyside has the lowest figure, with 37% of the total resident population in employment. Employment is an important factor in the generation of urban transport flows and these variations in the level of employment among residents may impact upon the modal shares of public transport and car use in the urban areas being considered.

Figure 3.5: Employment in the urban administrative areas



Key data issues:

- All data refers to 2002.
- Data displayed relates to the proportion of people living in the urban administrative area that are in employment.

- Additional data supplied by Prague, Aalborg, Ile de France region, Oxford, Copenhagen and London have not been displayed. These data related to the percentage of the local labour force in employment and are therefore not comparable with the other employment statistics submitted. No data was supplied by Brescia.

The large variations in the size and population of the cities and regions displayed in Figures 4.1 to 3.5 illustrate the challenge that detailed statistical analysis of the common indicators presents. No two cities are the same and therefore the aim of the common indicator analysis has been to try and identify trends in the urban transport systems present in each of the participating cities and regions.

3.2 Urban transport statistics

The statistics presented in this section relate specifically to the range of transport modes in each of the participating cities and regions. Table 3.1 shows the range of public transport modes available in each of the benchmarking cities. It reveals that buses and trains form the core modes of urban public transport networks, both of which are present in nearly all of the benchmarking cities. The Trolleybus is the least represented mode of public transport among the benchmarking cities, with only Athens, Bucharest and Lyon having trolleybus networks. In total 15 of the 25 benchmarking cities have tram networks and 14 have metro networks. Interestingly the cities that have metro networks all have tram networks, with the exception of Copenhagen. Stuttgart and The Hague are the only two cities that have tram systems, but no metro network.

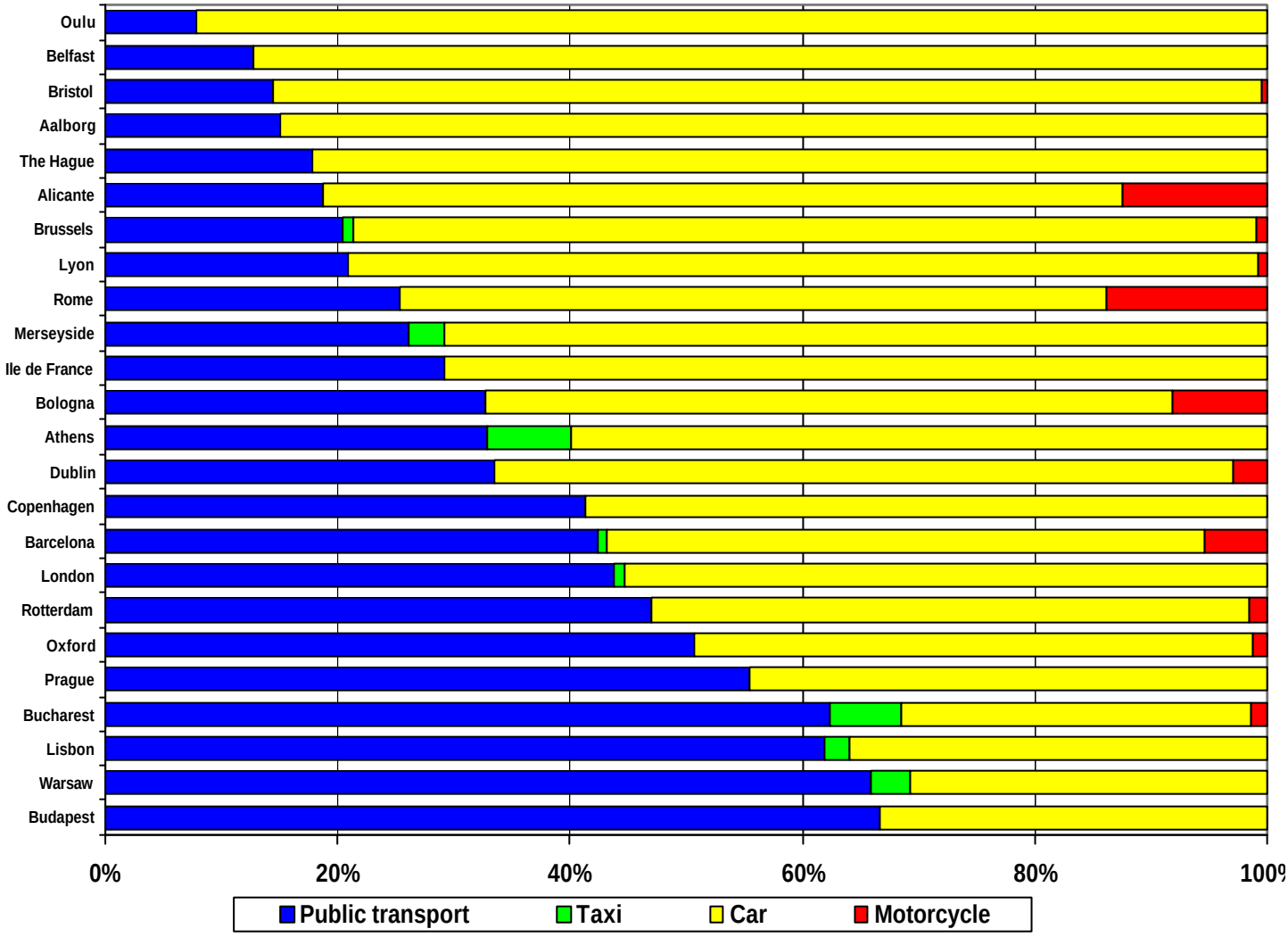
Table 3.1: Typology of public transport modes present in each city / region

	Bus	Train	Trolley	Tram	Metro
Aalborg	✓	✓			
Alicante	✓				
Athens	✓	✓	✓	✓	✓
Barcelona	✓	✓		✓	✓
Belfast	✓	✓			
Bologna	✓				
Brescia	✓				
Bristol	✓	✓			
Brussels	✓	✓		✓	✓
Bucharest	✓		✓	✓	✓
Budapest	✓	✓	✓	✓	✓
Copenhagen	✓	✓			✓
Dublin	✓	✓			
Ile de France	✓	✓		✓	✓
Lisbon	✓	✓		✓	✓
London	✓	✓		✓	✓
Lyon	✓		✓	✓	✓
Merseyside	✓	✓			
Oulu	✓	✓			
Oxford	✓				
Prague	✓	✓		✓	✓
Rome	✓	✓		✓	✓
Rotterdam	✓			✓	✓
Stuttgart	✓	✓		✓	
The Hague	✓			✓	
Warsaw	✓	✓		✓	✓

Figures 3.6 and 3.7 display the proportions of journeys made by each mode. Figure 3.6 illustrates the percentage of trips made using motorised transport, discounting the figures for cycling and walking which have been provided by some cities and which are frequently based upon estimates. The full modal splits are displayed in Figure 3.7 although these are less accurate than those displayed in Figure 3.6 which discounts the figures for walking and cycling. Explanations about the modal split data have been given in bullet points after Figure 3.7.

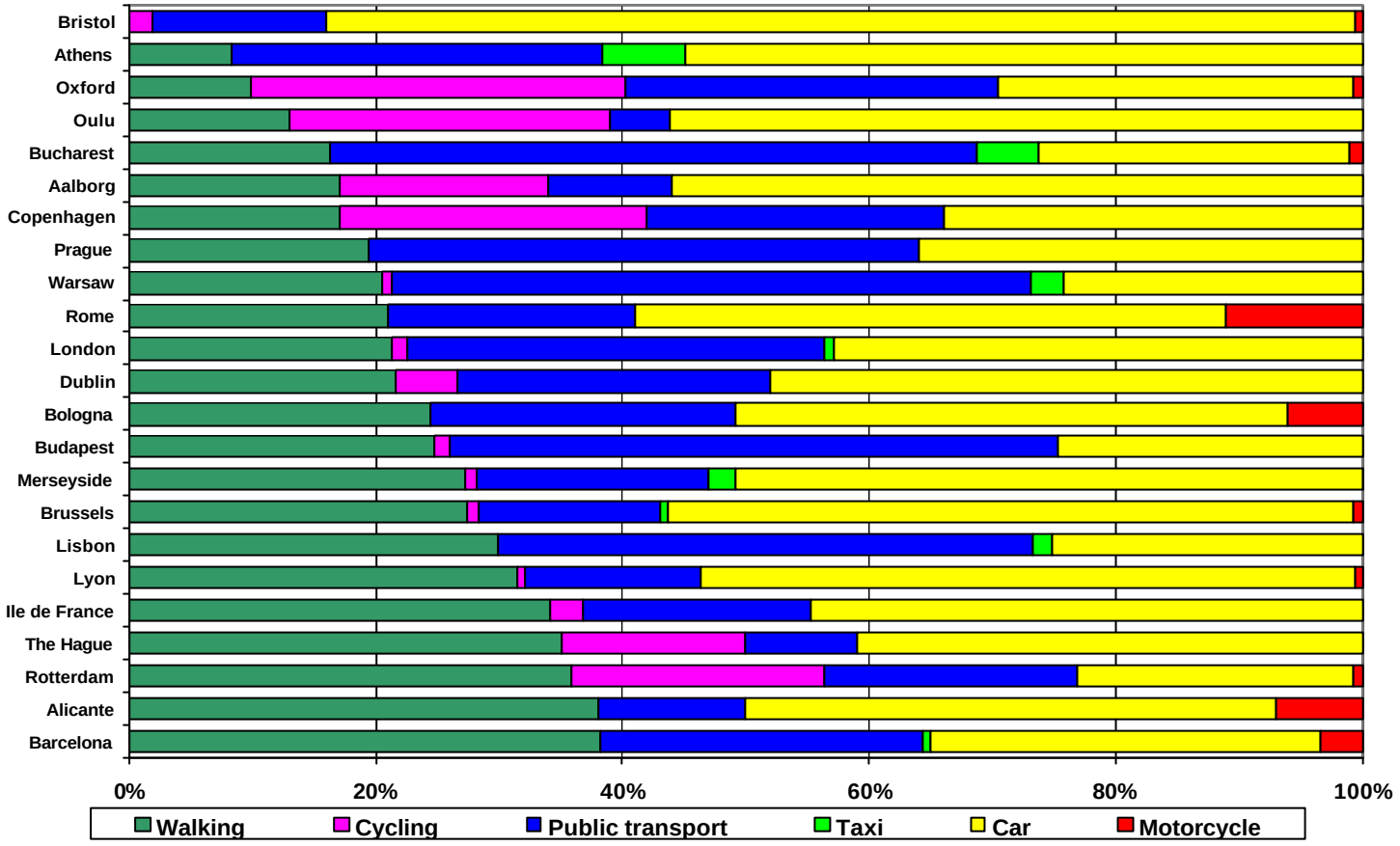
Figure 3.6 displays the modal split of motorised trips in the benchmarking cities and the figures have been ranked so that the cities with the largest public transport modal shares are displayed at the bottom of the chart. Oulu has the smallest proportion of public transport trips per day and more than 90% of total daily trips are made by car. This is much greater than in Bucharest, where only 29% of all trips are made by car. The city of Budapest has the highest percentage of public transport trips per day, at just over 65%. A number of other cities display significant proportions of journeys that are made using other forms of transport. Both Rome (13.9%) and Alicante (12.5%) display large proportions of journeys made by motorcycles and in Bucharest, 4.9% of journeys are made by goods vehicles. It is difficult to draw meaningful conclusions from these other modes of transport, because few cities were able to disaggregate their data completely.

Figure 3.6: Modal split of daily motorised trips in urban administrative areas



Please note that footnotes for Figure 4.6 are displayed beneath Figure 4.7 (overleaf).

Figure 3.7: Modal split of daily motorised and non-motorised trips in urban administrative areas



Key data issues for modal split data in Figure 3.6 and 3.7

- The data displayed relates to the study year of 2002 except for: Bologna (1991), Budapest (1994), Lyon (1995), Aalborg (1997), Lisbon & Warsaw (1998), Athens, Bucharest & Rome (1999), Alicante (2000) and Rotterdam (2001).
- Walking and cycling data was unavailable for Belfast.
- Data for Bologna relates only to systematic journeys and the figures for walking and cycling are combined.
- The data for Prague, Barcelona and Alicante in figure 3.7 are the combined modal shares of walking and cycling.
- Data for Dublin reflects all the daily trips that are made to places of work, school and university only (irrespective of start time) do not therefore reflect the total level of daily trips. The figures are therefore of more non-car based modes, because the majority of these types of trips take place during the peak daily transport hours.
- Please note that 4% of all urban transport trips in Bucharest were attributed to lorries. This figure has been removed from figure 3.6 and 3.7 for improved comparability.

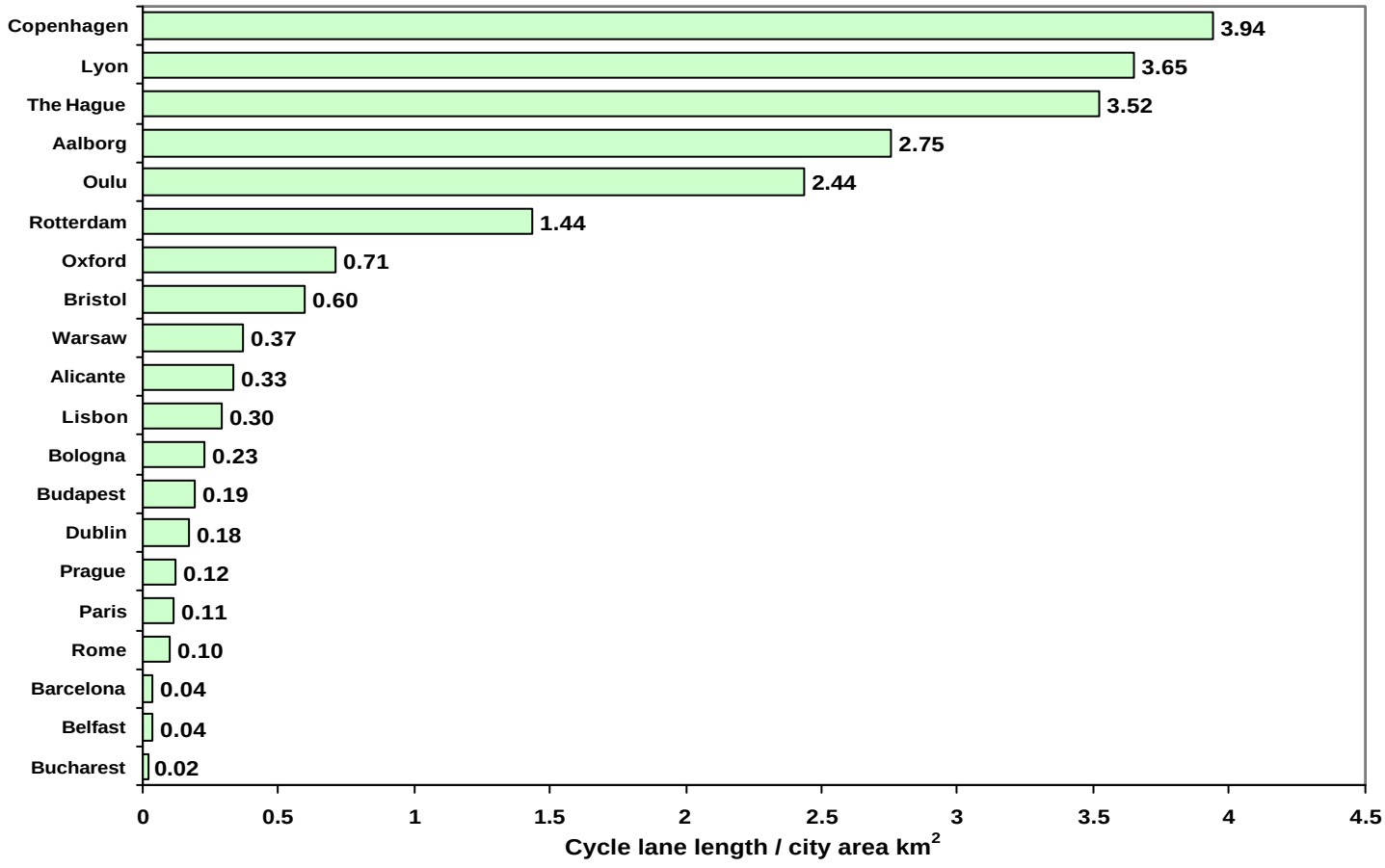
Figure 3.7 shows the modal split figures including the submitted data for walking and cycling trips. This chart displays the cities in rank order of modal share for walking. It is important to consider that the data the participants have provided for walking and cycling modal share does not always differentiate between the two modes. As already stated these figures are often based upon estimates, rather than site surveys and traffic counts and so the reliability of the walking and cycling data for statistical analysis is questionable.

Athens has the lowest share of walking trips of those cities that were able to provide data and is also an unpopular location for cycling. It is possible that the warm climate in Athens could explain the low levels of walking and cycling in the city. The city with the highest genuine percentage of walking trips is Rotterdam, where 36% of all journeys are made by people walking and a further 20% of all daily trips are accounted for by cycling. The Hague, another Dutch city, also performs well in terms of sustainable mobility with 50% of all daily trips being accounted for by walking and cycling.

The Netherlands therefore appears to be at the forefront of environmentally sustainable urban transport. It is well documented that cycling is a popular mode of transport in the Netherlands, aided by the country's suitable terrain and "cycling culture", but the practices these cities have adopted to promote sustainable mobility could still be considered as potential case studies from which other cities can learn. This is a potential area of further research during the second year of the Urban Transport Benchmarking Initiative. In addition the cities of Copenhagen, Aalborg and Oxford display large cycling modal shares which could also be points of further enquiry in the second year of the project.

Figure 3.8 illustrates the length of cycle lanes per square kilometre of the city area for each of the cities participating in the initiative. The cities of Rotterdam, Oulu, Aalborg, The Hague, Lyon and Copenhagen are the only cities which have more than one kilometre of cycle paths per square kilometre of surface area. Despite the large cycling modal share figures displayed in Figure 3.7, the city of Oxford displays quite a small density of cycle lanes in relation to its surface area.

Figure 3.8: Cycle paths in relation to surface area



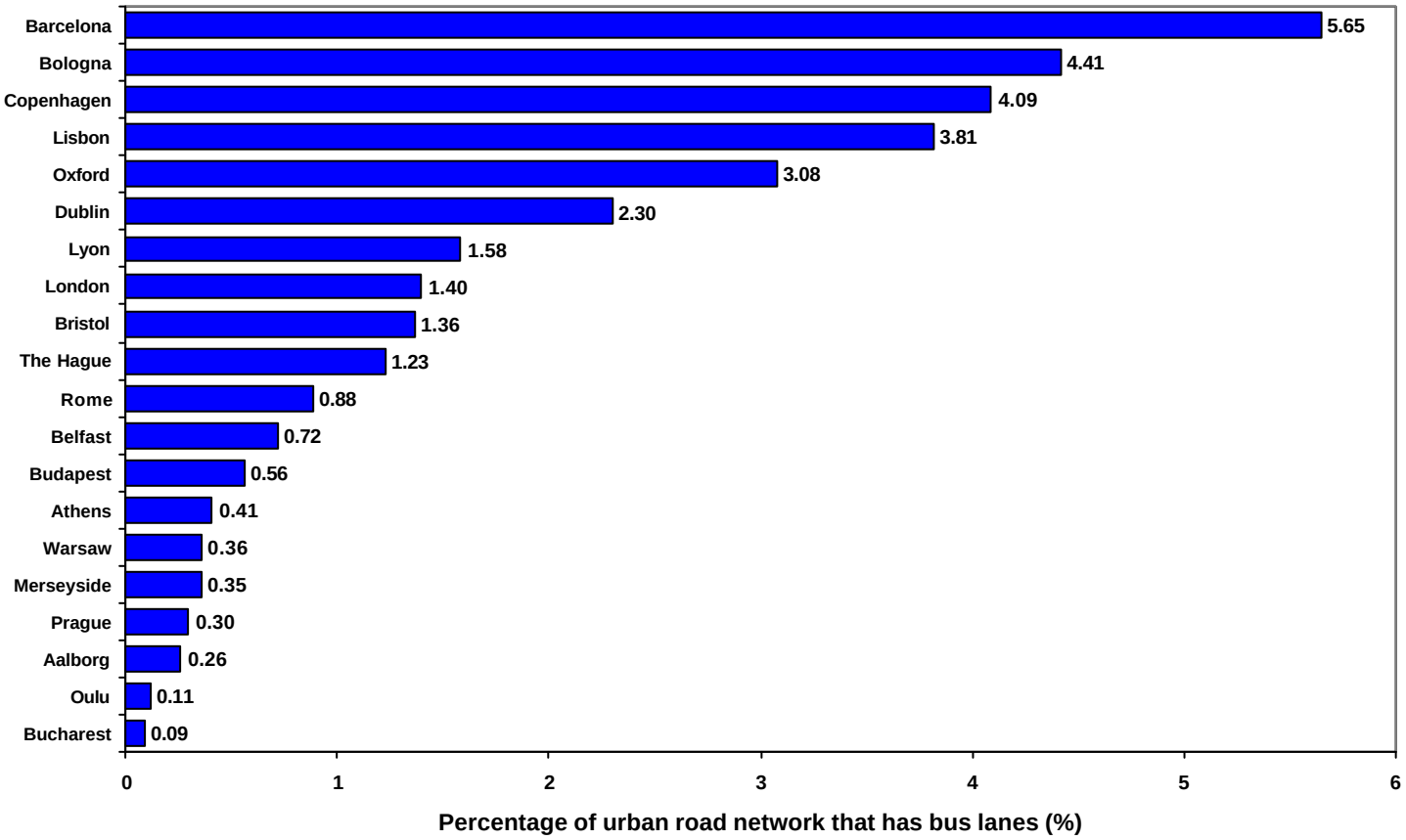
Key data issues

- All data relates to 2002, except for: Rotterdam and Rome (1999), Lisbon (2001) and Bristol & Warsaw (2003).
- Data for Dublin is based upon the estimated 2-way length of the strategic cycle network (both segregated and un-segregated).
- Data for Rome relates to the regional area.

The benchmarking cities display a large range of cycle lane densities. Bucharest has just 20 metres (0.02km) of cycle lane per km^2, which is considerably smaller than the 3,940 metres (3.94 kilometres) of cycle lane per square kilometre in Copenhagen.

Figure 3.9 shows that Barcelona (6%) has the highest percentage of road network attributed to bus lanes. A number of other cities have values over 3% including Bologna, Copenhagen, Lisbon, and Oxford. In Bucharest bus lanes make up a much smaller 0.09% of the total road network. Interestingly the other cities that display small percentages of road network given over to bus lanes are Aalborg and Oulu, which are also the two smallest cities in terms of population. This suggests that bus lanes are more prominent in larger cities where population and thus the number of cars are likely to be higher.

Figure 3.9: Bus lanes as a percentage of total road network

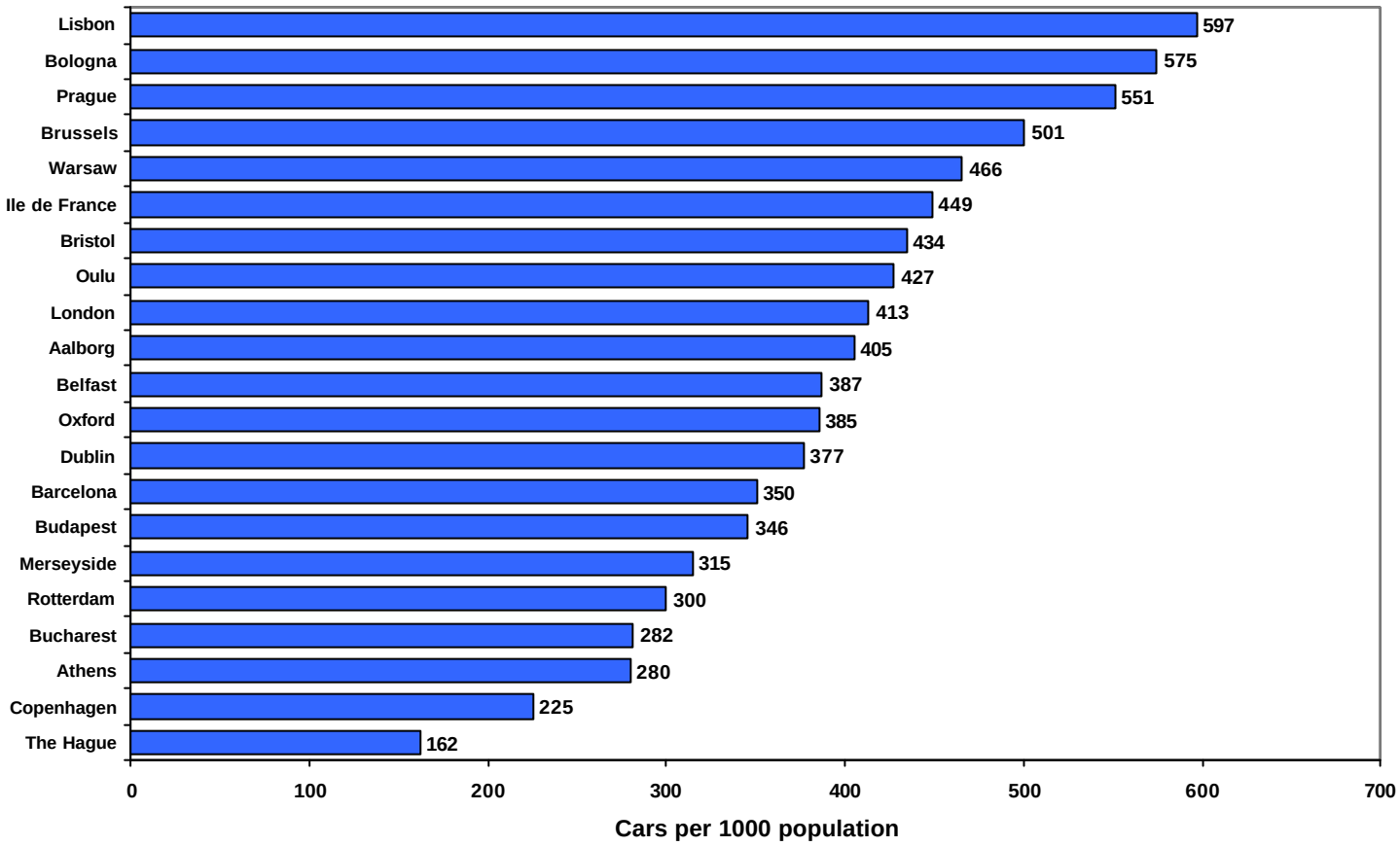


Key data issues

- All data relates to 2002, except for: Warsaw, Athens & Lisbon (2003), Merseyside, Bristol, Belfast and Copenhagen (2004).

- No data was available for the Ile de France region, Brussels, Stuttgart and Rotterdam.

Figure 3.10: Cars per 1000 population



Key data issues

- All data relates to 2002, except for: Barcelona & Ile de France (2000), Bologna, Dublin, Lisbon, Oxford and Stuttgart (2001) and Merseyside (2003).
- Data for Belfast includes both cars and vans.
- Data for London refers to the Greater London area.
- Data for the Ile de France, Merseyside and Barcelona relates to regional areas.
- Data for Lyon and Rome are not presented in Figure 3.11, because data submitted cannot be compared to a similar population.

Figure 3.10 displays car ownership in terms of the number of registered cars per 1000 population. The city with the highest level of car ownership is Lisbon, with 597 cars per 1000 people. Brussels, Prague and Bologna also display high levels of car ownership, with each city having more than 500 cars per 100 inhabitants. The Hague (162 cars per 1000 population) and Copenhagen (225 cars per 1000 population) display the lowest levels of car ownership among the benchmarking cities. The average number of cars per 1000 population for all of the cities listed above is 457. Figures for car ownership are not displayed for all the benchmarking cities. This is because some of the figures relate to regional area and not the urban administrative areas and are therefore not directly comparable.

3.3 Trends identified by data analysis

Statistical analyses of the common indicator data have identified four overarching trends in the urban transport systems in each of the participating cities and regions. Three of these key trends are particularly salient and they are outlined in brief in this section of the summary report. Further details about the trends identified are displayed in full in Annex A1, the common indicator report.

The influence of GDP per capita upon urban transport modal share

Affluent cities have greater levels of car use than less affluent cities. There is a negative statistical relationship between public transport modal share and GDP per capita, which suggests that as GDP per capita increases people's propensity to use public transport decreases.

Statistical analysis of the common indicator data set has show that GDP per capita has an important influence upon the modal choices of people travelling in cities. Where GDP per capita was found to be higher, the modal share of public transport was generally lower and the proportion of trips made by cars was higher. This suggests that a direct positive relationship exists between average income levels and car use, and an inverse relationship exists between income levels and public transport patronage. These trends are illustrated by Figures 3.11 and 3.12 respectively (below).

Figure 3.11: The relationship between GDP per capita and modal share of car trips (excluding walking and cycling)

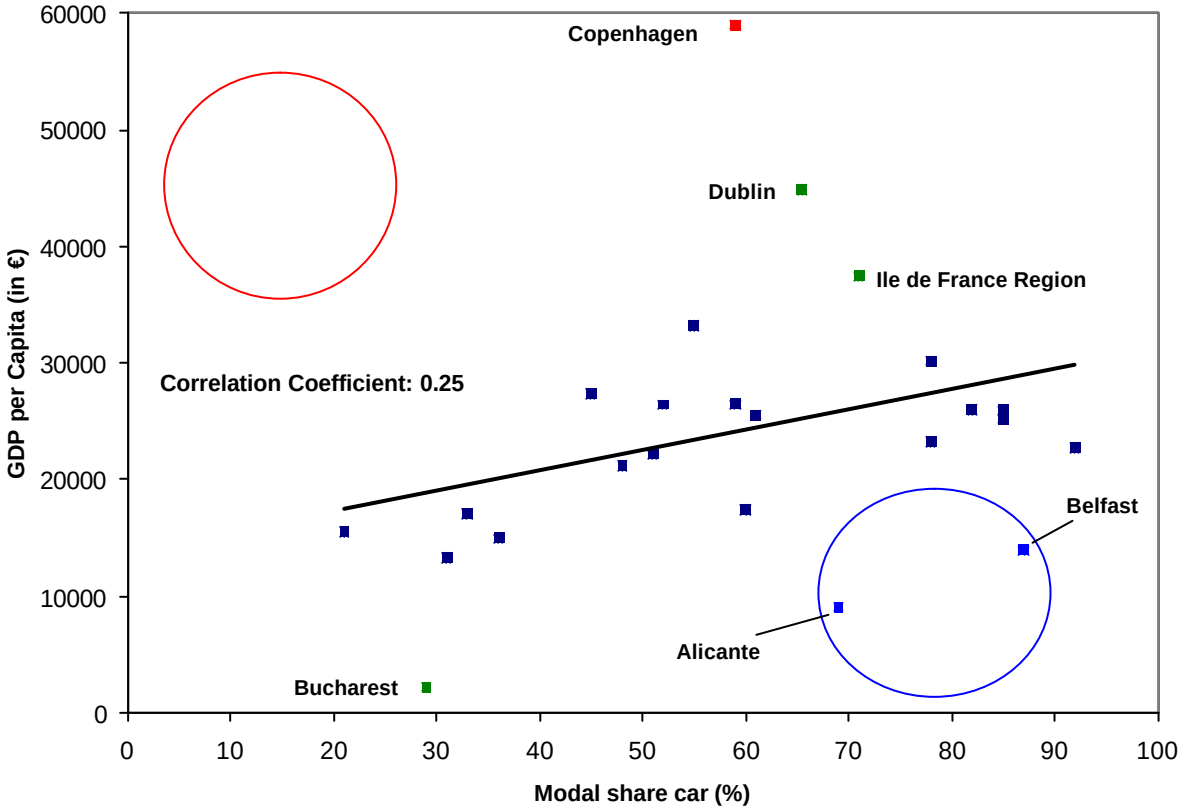
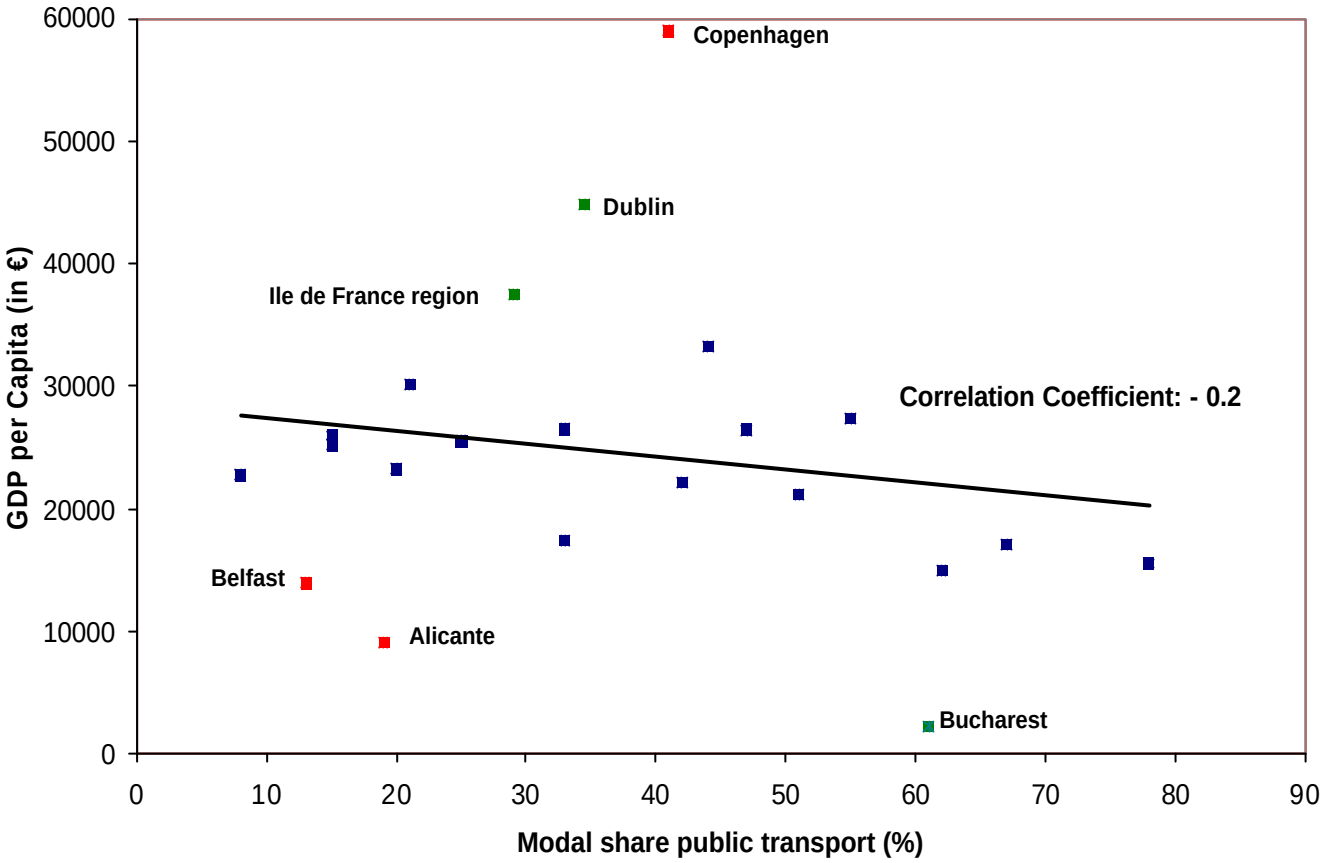


Figure 3.12: The relationship between GDP per capita and public transport modal share (excluding walking and cycling)



These trends have obvious policy implications both for less affluent cities and wealthier cities, because they imply a clear preference for car travel. People who can afford to travel by car appear to do so unless traffic congestion, lack of parking or access restrictions associated with large, heavily urbanised cities prevent them from doing so (as in London or Rome). It also implies that people in less affluent cities would travel by car, if it were more affordable, but instead rely upon public transport.

Urban cycling and the impact of investment in cycling infrastructure

Wealthier cities are those most likely to have larger cycle path networks. Those cities with large cycle path networks in relation to the total road network are also likely to display a high level of cycling modal share.

GDP per capita also appears to have a strong impact upon people's propensity to cycle. In cities where GDP per capita levels were high there appears to be a greater degree of investment in cycling infrastructure. These cities display the largest cycle path networks both in absolute terms and in proportion to the length of the urban road network. In addition a very strong correlation was discovered between cities with large cycle networks (in relation to the length of urban roads) and the modal share of cycling in those cities. These trends are illustrated by Figures 3.13, 3.14 and 3.15 (overleaf).

Figure 3.13: Correlation between the length of cycle paths and GDP per capita

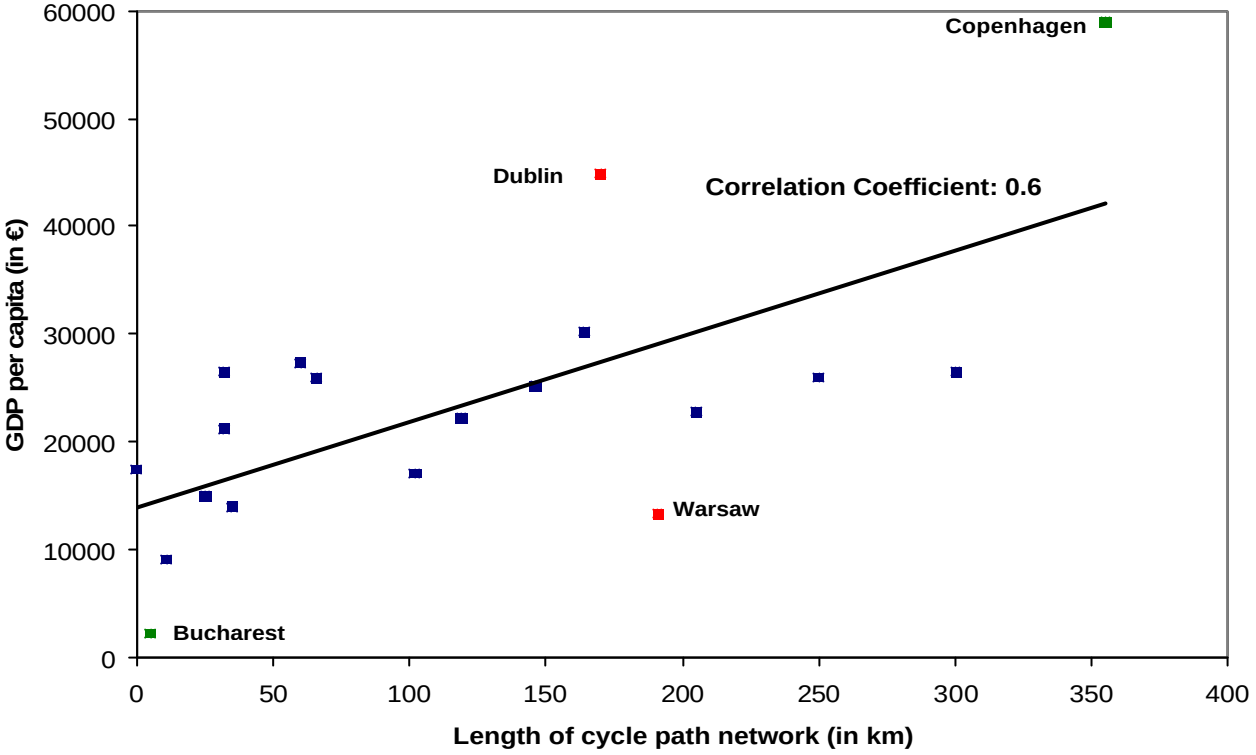


Figure 3.14: Correlation between the proportion of road network that is cycle paths & GDP

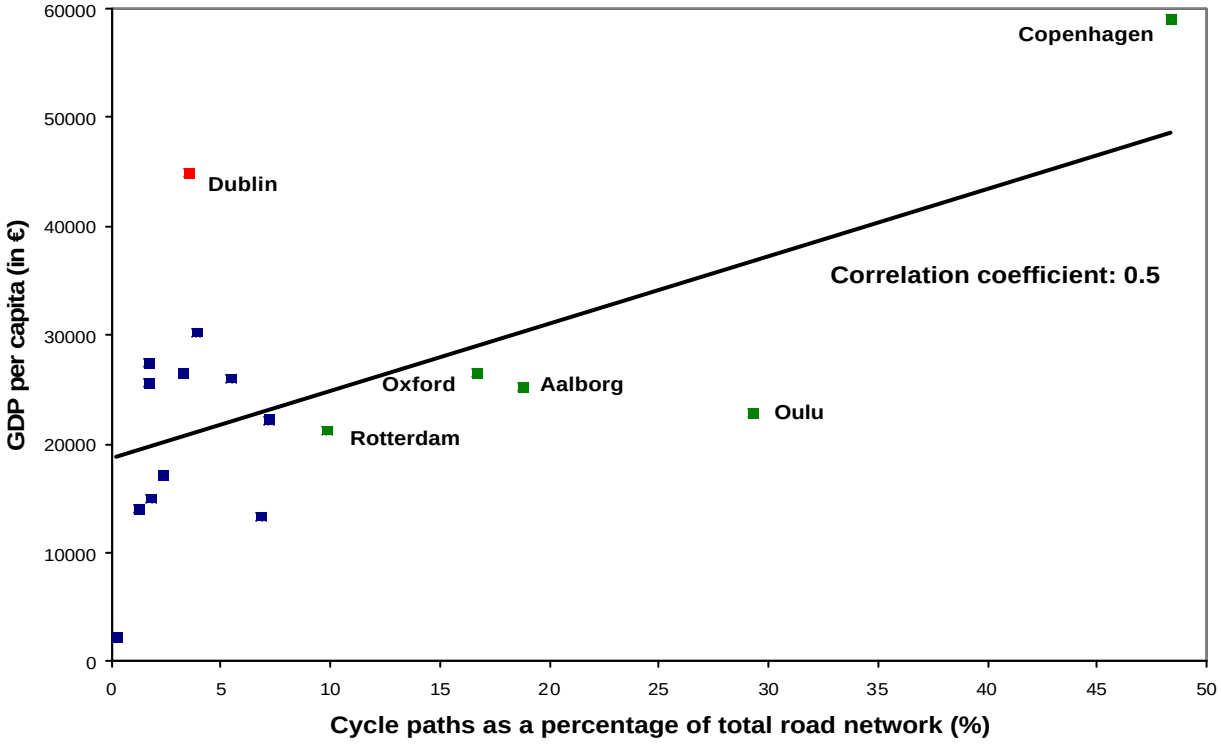
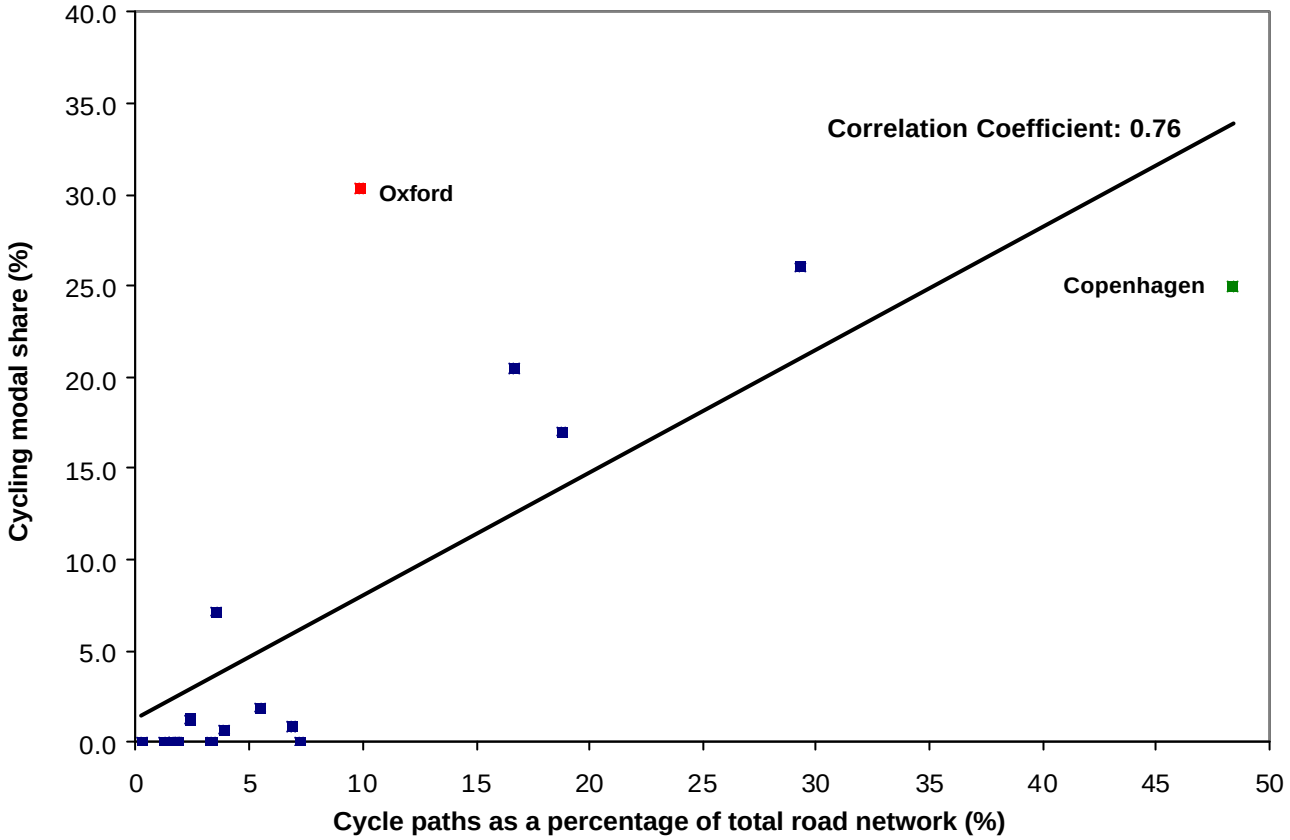


Figure 3.15: Relationship between cycling modal share and the proportion of road network that is cycle paths.



These findings appear to send a clear message to policy makers that are keen to develop a cycling culture in their cities. People are more likely to cycle where they are provided with the cycle path infrastructure that enables them to cycle safely and quickly. It is interesting that the cities with the largest cycle networks in relation to road network length (Copenhagen, Aalborg and Oulu) are located in Scandinavian countries. These cities all display very healthy cycling modal share figures, despite what conventional logic would suggest where weather conditions are not ideally suited to cycling. This finding has also borne out by the site visits of the demand management and cycling working groups to Oulu and Copenhagen. This is certainly a topic that the cycling working group could consider for further study during year two of the Urban Transport Benchmarking Initiative.

Urban metro systems

Cities with large populations are those most likely to have extensive metro systems. A suggested threshold for metro provision is 40km of metro network per 1 million inhabitants. Using this threshold Dublin and Warsaw could be considered as potential metro cities.

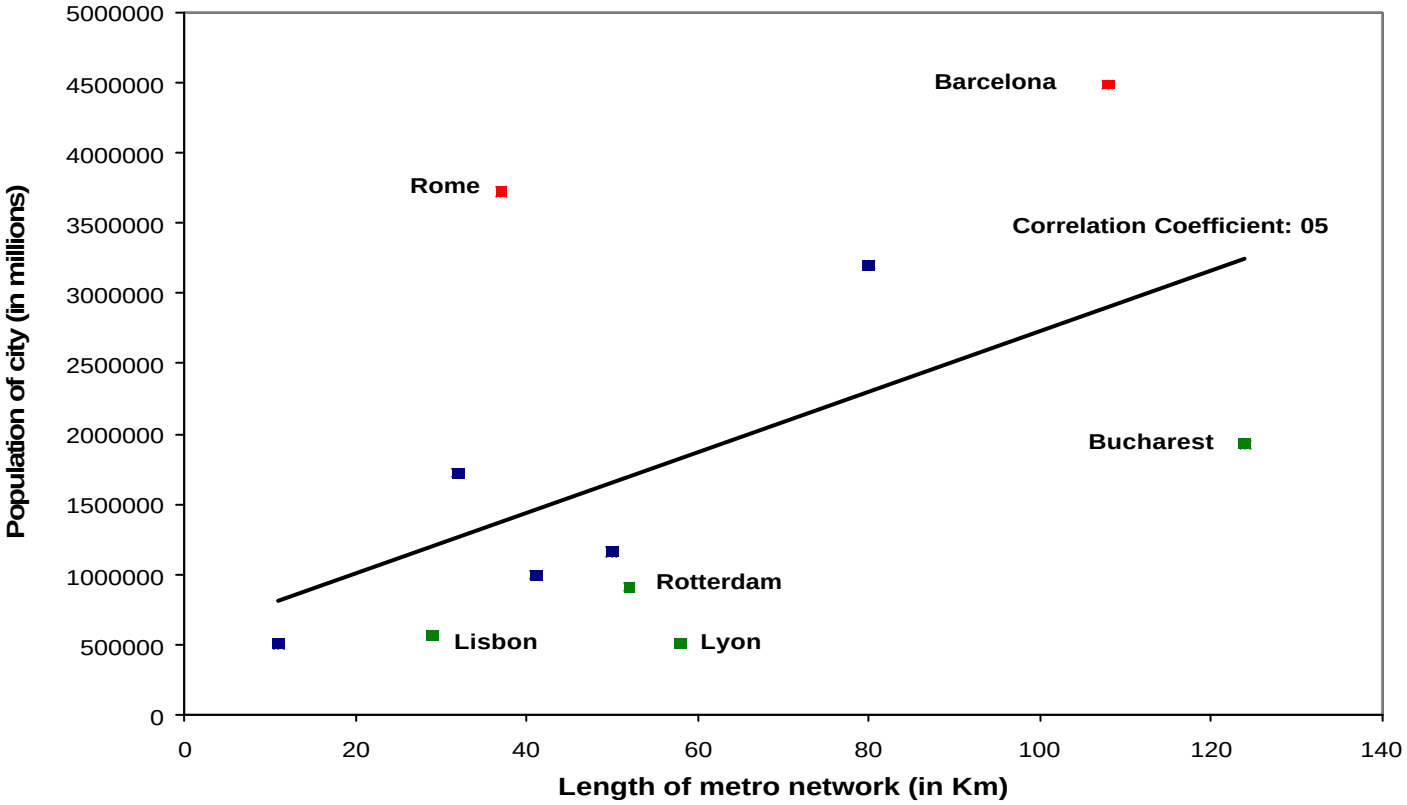
In total 13 metro-cities participated in the Urban Transport Benchmarking Initiative and statistical analysis of their common indicator data revealed that the largest cities in the working group were those with the largest metro networks. In order to perform a detailed analysis with the data it was necessary to exclude London and Paris, because they both demonstrate exceptionally large metro systems in relation to the other cities being compared.

Table 5.1 and Figure 3.16 (below) reveal the strong positive relationship between the population of the cities and the size of their metro networks.

Table 5.1: Metro-cities participating in the Urban Transport Benchmarking Initiative

City	Length of metro network (km)	Population density of city (people per km^2)	Population of city	Surface Area of city (km^2)
Copenhagen	11	5,556	500,000	90
Lisbon	29	6,674	564,657	85
Budapest	32	3,275	1,719,342	525
Rome	37	2,887	3,723,649	1290
Brussels	41	6,162	992,041	161
Prague	50	2,339	1,160,000	496
Lyon	58	8,177	507,000	62
Athens	80	5,882	3,200,000	544
Barcelona [1]	108	1,385	4,482,623	3236
Bucharest	124	8,094	1,926,334	238
Rotterdam [2]	52	29,228	909,000	31.1
Ile de France/Paris	218	3,922	9,644,507	2459
London	408	4,629	7,300,000	322
Mean Average	**96**	**6,785**	**2,817,627**	**733**

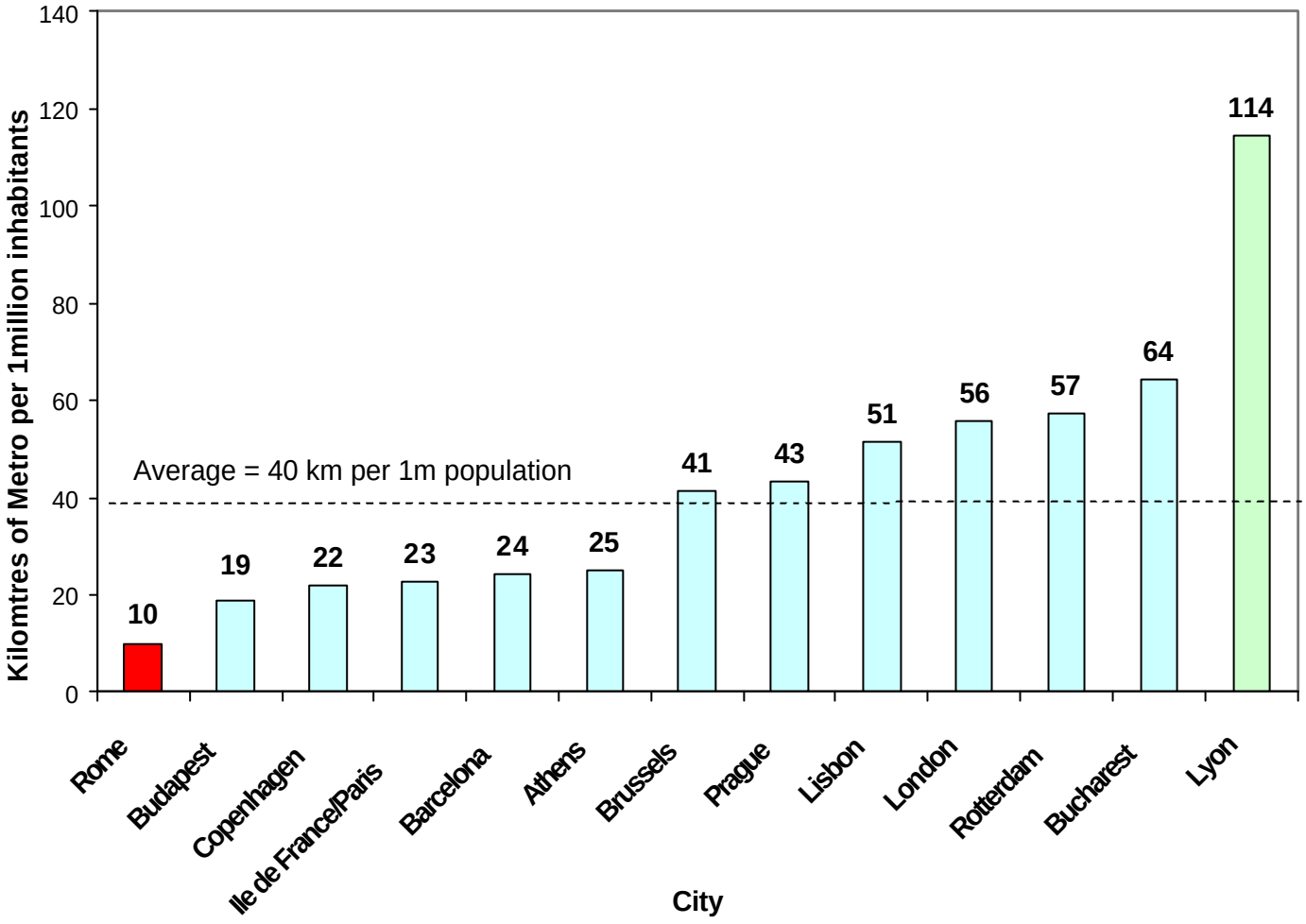
Figure 3.16: Length of metro network compared to total urban population in each metro-city



[1] Data for Barcelona refers to the metropolitan area of Barcelona.
[2] Data for Rotterdam relates to the area and population covered by the RET public transport network

Once the relationship between the length of metro networks and population was established it was then possible to contrast the length of metro network per million inhabitants in each of the metro cities. This comparison is displayed in Figure 3.17 and illustrates that the majority of the metro-cities in the project have between 20 km and 60 km of metro network per 1 million inhabitants. Although this measure does not take geographical features such as surface area, or other modes of urban transport into account, Figure 3.17 suggests that approximately 40 km of metro network per 1 million inhabitants is a useful threshold for metro provision. Applying this threshold to the rest of the benchmarking cities indicates that Dublin and Warsaw could both be considered as potential metro cities based on the size of their populations.

Figure 3.17: Comparison showing length of metro networks in relation to population



The statistical analyses of the metro-cities in the Urban Transport Benchmarking Initiative therefore suggest that a critical mass of population is necessary to support a metro system. The majority of cities participating in the benchmarking project with populations in excess of 1 million inhabitants were metro-cities. In every case these metro networks were all supported by a wide range of other transport modes (bus, train and particularly tram) and were generally focused upon central urban areas (those in Paris and London are exceptions). Averaging the size of metro systems across the 13 metro-cities revealed a demonstrable average of approximately 40 km of metro per million inhabitants. Although this is only a rough threshold, which needs to be considered in relation to the other public transport modes available in each city, it does suggest that both Dublin and Warsaw are potential metro-cities.

4. THEMATIC WORKING GROUPS

The five working groups that took part in the Urban Transport Benchmarking Initiative have each produced individual working group reports (Annexes A2-A6). These reports and relevant data annexes are downloadable from the project website (www.transportbenchmarks.org) and this section of the summary reports represents an overview of the key findings from each working group.

4.1 Definition of interesting practice

The process of data analysis adopted by the Citizens' Network Initiative has greatly influenced the approach to this project. The aims of the Urban Transport Benchmarking project data analysis were clearly defined at the outset and these remain unchanged now:

- To look for best practices and to establish reasons for variations between indicators for which are data are collected.
- To encourage all participants to take part in this process in order that we produce a set of findings that are supported by reasoned analysis rather than a collection of statistics.

The term "Best practice" has been heavily debated over the course of previous benchmarking projects. The major problem is that there is no all-encompassing definition which clearly defines best practice. In the case of this benchmarking initiative the term "best practice" is applied more loosely to include interesting practices that are displayed in the operations of the urban transport systems of the participating cities.

From the outset it has not been the goal of the Urban Transport Benchmarking Initiative to create a competitive atmosphere among the participants and at the launch conference it was clearly stated that this is not a competition with "winners" and "losers". Promoting interesting practices, through the use of benchmarking, so that a wide audience of cities, operators and local authorities may benefit is a concept with huge potential. Creating a set of "winners" and "losers" does not help to achieve this, because it may dishearten those perceived to have "bad practices", yet these groups of participants probably have the most to gain from this type of project.

The aim of the project is therefore to try and offer the participants the chance to get the most out of the project by presenting a set of findings that will interest all of the participants. Disseminating a range of interesting practices is also likely to be of wider interest beyond those participating in the project. The ultimate aim of the working groups is to establish the interesting practices for their chosen theme and develop a set of case studies that focus upon the transferability and

4.2 Overview of the working groups and key findings from year one

Behavioural and Social Issues in Public Transport

The Behavioural and Social Issues in Public Transport working group was made up of representatives from 6 organisations. These are listed below.

- Paris
- Lisbon
- Emilia Romagna Region
- Ile de France
- Bucharest
- Athens

The working group attended site visits in Valencia, Rotterdam and Helsinki and focused upon the research question:

"How can we influence travel behaviour in order to increase the market share of public transport and retain existing customers?"

In total data was collected for approximately 30 indicators by the working group and the key findings from this data have been presented below:

- The cities in the working group represented a range of circumstances. Athens, Bucharest and Lisbon are relatively "young" cities in terms of the age of their populations. In addition these cities display the highest levels of public transport modal share, although these are changing. In Lisbon public transport modal share is falling dramatically, while in Athens it is increasing. Paris, Bologna and the two regions they reside in display completely opposite trends. These cities and regions demonstrate reasonably stable levels of public transport modal share and Bologna in particular displays a much older population structure than the other cities in the working group.

- The population and trip purpose figures can be compared to reveal target markets for public transport in each of the cities and regions. Bucharest has a young population and the trip purpose figures for the city reveal a large proportion of trips are made by people travelling to places of education. In comparison, Athens has the largest proportional student population in the working group (23%), but also displays the smallest proportion of trips for the purpose Study / Education (4%). This appears to suggest that, despite a 50% concessionary fare for students, there is a relatively untapped group of potential public transport users in Athens. In the Emilia Romagna region the proportion of trips attributed to study and education is also low (8%) which implies that more young people could also be encouraged to use public transport.

- In most of the cities in the working group a large proportion of travellers use public transport to get to work (at least 50%). However in the Ile de France region a much smaller proportion of public transport trips are made using public transport modes (32%). This could be explained by a "shadow effect" from Paris, although a large proportion of the regional population is made up of people of working age.

- Despite having the cheapest public transport fares in terms of absolute cost, Bucharest displayed the highest cost of public transport in real terms. Even so, Bucharest still has the highest level of public transport modal share (52%) of all the cities in the working group. This illustrates that people's decisions to travel by public transport do not rest purely upon the cost and therefore simply making public transport cheap, does not necessarily guarantee greater patronage. Further analyses of the cost of car use would greatly expand the scope of this finding.

- In the Emilia Romagna region concessions are only offered to students, despite a large proportion (27%) of the population being aged over 65. It is possible that offering older travellers an incentive to use public transport could improve the number of people that use public transport, particularly outside of peak hours of travel.

- Paris appears to lead the way in terms of the amount of integrated public transport information that is currently available and the fact that it can all be accessed via the internet. Although public transport information websites are a standard among the group, Paris and the Ile de France region set the benchmark by being the only city / region to operate an online journey

planning facility. The fact that all public transport information in Paris and the Ile de France is integrated reflects the fact that RATP and STIF have close links and RATP also operates the bulk of the public transport services in the city.

- The level of real time information available in Paris is also more substantial than in other cities in the working group. The media is still in its infancy, although in Paris the newly built tramway system was designed to have real time information, while the RER has recently been retro-fitted. As a result these modes have 100% coverage of real time information, whereas it is not yet available in Athens.

- An annual survey of customer satisfaction appears to be virtually a standard within the working group, although there are many differences across the group in the way customer satisfaction is measured (scales used etc). The most common method of interviewing people is by telephone, although in Bucharest (and Rotterdam and Helsinki from site visits) face to face interviews are also used. RATP (Paris) were the only organisation to conduct an interim survey on a more regular, quarterly basis. In addition Paris is the only city where complaints are handled using e-mail, which enables faster handling and explains the shorter response time to complaints.

- The majority of the promotional activity and information produced by the cities in the working group is aimed at children and students in order to try and encourage them to travel by public transport. It is possible that further promotional activity could target offices and large employers in order to try and encourage further modal shift from private motorised modes to public transport.

- Partnerships to promote the use of public transport were only evident in Paris (Euro Disney) whereby combined tickets (transport and park entry) are combined to offer better value to people travelling from central Paris to Marne La Vallée. In Rotterdam innovative use of advertising space (on modes of transport and in free "Metro" publications) enabled RET to barter deals with traffic generators (Pathé cinema & Feyenoord Football Club) where advertising space was given free in return for the supply of discounted entry tickets to attractions.

- Partnerships were not present in any city at a smaller level, whereby retail parks or commercial developments were targeted as potential sources of new public transport passengers. This type of "Travel Plan" style approach, where employers and public transport organisations work together to improve the transport options for employees, therefore appears to have potential within the working group.

City Logistics

A total of four organisations have participated in the City Logistics working group throughout the first year of the Urban Transport Benchmarking Initiative. These are:

- Genoa
- Aalborg
- Rome
- Bristol

In addition the city of La Rochelle was initially keen to participate in the benchmarking project, but did not have the resources to attend site visits or to contribute any data to the project. The city of Warsaw also submitted some data for the thematic indicators, but it was hard for the city to participate fully, because the city's representative moved jobs during the project.

The working group attended site visits in Aalborg, Bristol and Rome and chose to focus their study upon the following research question:

'How can cities, operators and customers work together towards improving the collective transport of passengers and goods?'

A total of 35 data indicators were collected in order to raise some understanding about the chosen research question. The group found that a lack of previous benchmarking on the topic of city logistics made the process of data collection and analysis particularly challenging. The group's key findings were:

- The low number of working group participants made it difficult to draw in depth comparisons between the various cities in the group. It is hoped that with more cities in the group for year two of the Urban Transport Benchmarking Initiative, the City Logistics working group will be able to present a more thorough quantitative analysis.

- The concept of the target area worked well, this allowed the cities to focus on the area that was most significantly impacted by actions of city logistics. In all the cases, where complete data was provided, this area was 1% of the total area of the city and in each city the target area represented the site with the main concentration of retail businesses.

- Very similar levels of access restriction, such as pedestrianisation, exist in the cities of Bristol and Aalborg. All of the cities in the group have implemented some form of limited access for commercial vehicles. The majority of the cities in the group have limited access by time of day, while several offer varying levels of access according to the type of vehicle. Bristol is unique in specifically outlining times where it is permitted to unload and this approach can be seen as one of the group's interesting practices.

- The benchmarks related to type of business vary significantly according to city. There is no clear way to explain this using the data. The only variation that can be explained is the type of shops present in each of the cities. In Bristol, for example, there is a high proportion of department stores and in Genoa there is a higher than average proportion of cafés. These findings indicate the nature of goods movement and freight deliveries in each of the target areas, which is of great use to any city seeking to implement a goods management system such as that being trialled in Bristol.

- The number and density of businesses in the target area of each city in the working group also varies significantly. In Bristol there is a higher proportion of large shops compared to the other cities in the working group. This pattern appears to have emerged because of the planned nature of the CBD compared with those in other cities. In the other cities in the working group a large section of retail establishments are operated on a much smaller scale by families and individuals. This is very important, because the different ways these firms operate significantly affects the number and scale of deliveries that are received on a daily basis. This finding is highly significant and is likely to have a major influence over the degree of impact that deliveries and freight movements will have in a city. This is therefore an ideal topic for further analysis in year two of the Urban Transport Benchmarking Initiative.

- The number of vehicles entering the target area is naturally very important to benchmark from a city logistics perspective, but presented one of the toughest challenges in terms of collecting

data. The difficulty encountered was primarily due to the different sizes of the participating cities as well as problems with measuring the data. As a result the information that has been gathered may not truly reflect the situation in each of the participating cities. Several of the cities had problems identifying a suitable location for their counters. Key problems encountered stemmed from trying to ensure that all the vehicles being counted were going into the target area. Further difficulties arose from not being able to verify whether all of the vehicles entering the target area are actually making deliveries, passing through the target area, or accessing the city centre for alternative reasons. In year two of the project the process of traffic counting will need to be refined if it is to be successfully implemented.

Cycling

The Cycling working group was forced to work on a much shorter timescale than the other working groups in the Urban Transport Benchmarking Initiative. As a result only 4 cities were able to take part in the working group. The represented cities were:

- Oxford
- Copenhagen
- Brescia
- Lyon

Due to the reduced timescale the group had only 2 site visits, to Copenhagen and Lyon. An initial inception meeting was held in Bologna to coincide with the "Veloinfo" second user conference in February in order to attract cities to participate in the working group. The research questions selected by the group are below;

'To what extent has cycling become mainstreamed in each city as far as both policy and practise is concerned?'

'What part have infrastructure and marketing played in achieving current levels of cycle usage, and what part is it expected they will play in the future?'

Because of the short timescale involved the working group used existing data indicators which have been tried and tested by a range of cycling networks and initiatives. The initiatives covered by this process included:

- League of American Cyclists
- CTC
- Netherlands – Cycle Balance
- Club des Villes Cyclables
- BYPAD
- Copenhagen Bicycle Account
- Switzerland – cycling policy of villages and small towns
- NATCYP

A total of 30 indicators were collected by the working group participants and the key findings were:

- Copenhagen and Oxford have similarly high modal split for cycle trips below 5km as a proportion of all trips made below 5km.

- All cities currently integrate cycling policy with wider policy documents. The degree to which policy is put into practice seems to vary though according to various factors, with Copenhagen setting the trend for provision of services for cycling.

- Most cities back this policy up by providing targets for improving cycle uptake and safety.

- There was no real consensus between cities in terms of the changing policy issues encountered. Issues seemed to be specific to each city and varied according to prevailing political interests, physical environment or culture.

- Cites stated parking issues and progress towards the development of cycle infrastructure as the most prominent barriers to improving cycling at present.

- The level of cyclists killed or seriously injured (KSI) varied amongst cities and it is not possible to give specific reasons for this variation. Copenhagen are studying a link between the degree of cycle safety and cycling speed. Safety is also a key study area for Brescia with the University carrying out specific research.

- Copenhagen has set a benchmark for the level of cycle use with the other cities experiencing much lower levels. Data collection methods vary however and not all trips are included in calculations such as for Oxford.

- Cycling is being integrated with public transport modes to different degrees. More integration is apparent on trains than on any other mode of transport.

- None of the cities stated that they had overly sufficient capacity for cycle parking at public transport interchanges.

- Where cities had either a cycle network or recommended routes (or both), these seemed to be well promoted with the use of signage, maps and even websites.

- Most expenditure within cities was on infrastructure measures, with Copenhagen again setting the benchmark for the group.

- Most cities deployed measures at traffic junctions to assist cyclists with road markings being the most popular.

- Most cities had cycle space which represented only a limited proportion of the total road network (about 5%), except for Copenhagen which led the way with about 45%.

- Internal promotion of cycling within authorities was mixed and was not consistent with Oxford which employed all of the options (including financial) for encouraging cycling.

- All cities except Brescia ensured that parking provision for cycling was integrated within the planning process.

- All cities are promoting the concept of 'Safe Routes to Schools'.

Demand Management

The Demand Management working group was made up of 8 organisations representing 7 different cities. The cities involved in the working group were:

- Ile de France
- The Hague
- Barcelona
- Warsaw
- Dublin
- Oulu
- London (Southwark MBC and Transport for London)

The Demand Management working group visited 3 cities in total (Barcelona, London and Oulu) and decided to focus upon the following research questions:

How do cities currently perform?
Which is the potential of demand management?
How can cities enforce demand management regulations?
How can cities make demand management measures acceptable?

Along with these research questions a set of 38 data indicators were defined at the Barcelona site visit and were collected by the participants in the working group. The group's main findings include:

- Density of jobs in the metropolitan area is greatest in The Hague at 3,106 jobs per km^2 and least dense in Warsaw where there are 278 jobs per km^2.

- Five of the seven working group cities have parking policies linked to development, most of which seek to limit the number of parking spaces at new developments.

- Five of the seven working group cities have parking policies linked to public transport policies, all of which demand that new development is well served by public transport.

- The cities with the lowest population density; Oulu and Warsaw, have the longest trip lengths for car journeys but Oulu also boasts the longest trip length for bicycle journeys.

- In Dublin and Ile de France, car trips are shorter (5.2km and 2.9km respectively), demonstrating a potential to substitute these trips by cycling and walking.

- Average lengths of train journeys in London (28.3 km) and Barcelona (21.9 km) are noticeably higher than in other cities. The high density of The Hague is reflected by the relative short length of average bus (2.1 km) and train (3.5 km) journeys.

- In Barcelona, 5.6% of the road network is covered by bus lanes and 2.3% in Dublin. In Dublin, only 19.4% of the road network is covered by bus routes, compared to 53.1% in Barcelona. Barcelona also has the greatest density of bus stops per km of route (10.3) whereas the other cities have between 0.8 - 2.9 stops per km of bus routes. The Ile de France has the densest metro network at 1.7 stops per km of track followed by Barcelona at 1.2 stops per km of track. London and Dublin have the densest rail networks at 0.6 stops per km of track.

- Taking the total number of public transport stops including all modes, The Hague has the greatest density of stops per km^2 at 6.9 followed by London at 5.9. The other cities have between 0.9 – 2.6 stops per km^2.

- Data on parking spaces proved difficult to collect. From the data available, Barcelona has the greatest number of parking spaces per 1,000 inhabitants at 240, followed by The Hague at 191 spaces per 1000 inhabitants. Ile de France has a high number of park and ride spaces (106,935) whereas other cities have relatively few park and ride spaces.

- Authorities in London proved to be the most stringent at issuing parking fines with 3.14 fines issued per car registered. Barcelona and Oulu issue 1.14 fines and 0.96 fines per car respectively. When measured against population, Barcelona issues 1004 fines per 1000 population, compared to 675 in London.

- Warsaw issues more fines per parking space (13.6) than any other city but this may reflect differences in the quality of the data collected as cities had difficulties recording exact numbers of parking spaces.

- The average normal urban speed limit of the 7 cities is 49.4 km per hour with Oulu notably lower at 40km / hr and Warsaw notably higher at 60km / hour. 35% of roads in Warsaw have limits under 60km / hour, 9% of roads in Oulu have limits over 40km / hour, In The Hague, there are more zones where the speed limit is lower than the norm of 50km / hour (57%).

- London has the greatest number of speed cameras at 400, followed by Barcelona with 99.

- In London, Dublin and Barcelona 80% of parking spaces are subject to parking charges.

- Maximum hourly on street parking charges are highest in Ile de France at €3, Warsaw has the lowest maximum at €0.57. The lowest minimum is in Dublin where hourly charges range from €0.19 to €1.90, Barcelona has the highest "minimum" as all charges are €2.50 per hour.

- In London, hourly parking charges vary most - from €0.63 to €3.36 and there is a similarly large difference between minimum and maximum charges in Dublin (€0.25 - €2.40) but in Barcelona, the charges are constant at €1.70.

- London has the highest annual parking revenues per inhabitant (€51 per year) and per car registered (€237 per year) and €940 per parking space.

- Only three of the cities, Dublin, Barcelona and London have some sort of road pricing scheme for which data could be provided. In Dublin, tolls for road bridges vary from €0.70 for a car to €4.90 for trucks and similarly in Barcelona, for an outer ring road, charges vary from €1 – €2.50 depending on vehicle size. In London, there is a flat charge of €7.50 (£5) to enter the congestion charging zone in the city centre. These charges bring annual revenues of €83 per car in Dublin, €37 per car in Barcelona and €107 per car in London. When measured against population, road pricing gives revenues of €31 per inhabitant in Dublin, €11 per resident in Barcelona and €23 per resident in London.

Public Transport Organisation and Policy

The Public Transport Organisation and Policy working group was made up of representatives from 9 cities. These were:

- Belfast
- Dublin
- Rotterdam
- Brussels
- Merseyside (Liverpool)
- Valencia
- Stuttgart
- Budapest
- Prague

These cities attended a total of 3 site visits which took place in Valencia (shared with the Behavioural and Social Issues in Public Transport Working Group), Copenhagen and Dublin/Liverpool (a shared site visit).

The working group agreed to collect 40 data indicators. In total 29 of these were performance indicators which aimed to explore the existing levels of delivery of public transport. The 11 other indicators were descriptive and focused upon the group's key topics of organisation and finance. Interesting good practices were identified by the group which are outlined below.

Public transport performance was compared between participants, using benchmarks for the quality of service (volume of supply, average age of vehicles, average frequency of vehicles, availability of services and punctuality), the level of patronage and finances. The following good practices were identified;

Volume of supply and average age of vehicles;

- The maximum age of buses are specified in the contract with the authority.
- The age of buses is taken into account in payment from authority (eg: Alicante)
- Integration with other measures (eg: Dublin: part of Quality Bus Corridor improvements)

Frequency;

- One of the key elements of the Quality Bus Corridors scheme implemented in Dublin is the provision of high frequencies. At peak time, there is one bus every minute on strategic routes.

Accessibility

- Renewal of the bus fleet can be encouraged by contractual provisions (e.g.: Alicante), as most new buses have a low floor.
- Legal provisions for the accessibility to public transport (The law requires Metro stations to be 100% accessible to PRM (people with reduced mobility) in the Netherlands)

Ticket and fare integration

- Coordination with and between public transport authorities at various levels
- Development of electronic ticketing

Level of patronage

The percentage of motorised trips made by public transport was compared in the cities / regions in the working group. Important considerations for the comparison are that the validity of comparison is greater among cities of similar urban population density and it is also interesting to distinguish between West-European and East-European cities.

The analysis showed that the modal share of public transport is relatively similar in a large number of cities (apart from those from Central and Eastern Europe, which come from a quite different background). It is relatively difficult to draw conclusions from this data, notably due to the fact that the hypotheses which are made in the different mobility surveys are not known. This prompts the need to further investigate this issue in order to better understand similarities and differences between cities, possibly from another angle (for instance, the occupancy rate of vehicles).

Finances

The working group collected data relating to the cost of public transport per inhabitant (operations and investment) and the rate of coverage of operating costs by fare box revenue. However due to reasons of confidentiality, this information has not been published.

In summary, the analysis of the indicators from the Public Transport Organisation and Policy working group shows that overall models of organisation and financing do not account automatically for the level of performance of public transport. Instead, the focus needs to be on concrete practices and their actual implementation. The group intends to further investigate identified practices which account for good performance, for instance the establishment of contracts between operators and authorities.

Participants expressed their satisfaction with the proceeding of the first year and found the project useful to reinforce local initiatives.

5. CONCLUSIONS

5.1 Overview of year one of the Urban Transport Benchmarking Initiative

The Urban Transport Benchmarking Initiative has continued to develop the theme of benchmarking in the European arena of urban transport by enlarging upon the work of the Citizens' Network Benchmarking Initiative. A total of 29 cities and regions from Europe have been represented in the initiative which has provided sufficient data for a successful benchmarking exercise. The aim is to use the findings of year one and the expressions of interest already received from cities to expand the number of participants during year two of the project.

Following the launch conference, four thematic working groups were quickly established but, as it replaced the "Energy and Environment" working group, the "Cycling Working Group" was not established until February 2004. Despite this late start, the group was still able to collect some data and undertake a comparative benchmarking exercise. The other four working groups were also able to perform a successful comparative analysis of their collected data. The data were defined entirely by the cities in the working groups with guidance from the respective experts. All of the groups except for the cycling working group were able to attend three site visits, which provided participants with invaluable first hand experiences of interesting urban transport practices in other cities. These visits have been reported as case studies and are available on the project website (www.transportbenchmarks.org) as well as the annexes which accompany this report (Annex A2.2 – A6.2).

All of the 29 participants were able to provide data for the thematic working groups and a total of 27 sets of data were received for the common indicators. This disparity reflects the fact that some cities were effectively duplicated by representation from a regional level (Southwark / Greater London and Paris / Ile de France region.) It was intended that the number of common indicators would be kept to a maximum of 20, although there were 30 indicators selected and gathered. The most effective indicators were those which were the simplest to collect and the aim for year two of the initiative is to build on the data successfully collected in year one. A degree of statistical analysis of the common indicator data was possible and a set of four key trends were identified as a result. A lesson learned from year one has been that "less is more" with regard to the definition of indicators and, with the benefit of hindsight, some of the indicators will be redefined to improve the process of collecting and comparing data.

The findings of each of the working groups are described in full in Annexes A2 through A6 and the full report of the common indicators is available in Annex A1. The headline results covered in these reports were presented at the end of year conference, which took place on June 15 2004. Presentations from this event and the reports described above can be found on the project website www.transportbenchmarks.org which is the main dissemination point for the project. Further presentations at non-project events will be used to raise awareness of the results of year one as will other networks such as POLIS, ACCESS, The Transport Statistics User Group (TSUG) and ELTIS.

The remainder of the concluding section of this report contains a summary of potential policy implications (section 5.2) which have arisen from these findings. Section 5.3 contains recommendations for improvements in the process of benchmarking based upon lessons learned, while section 5.4 outlines the next steps and future intentions for the Urban Transport Benchmarking Initiative.

5.2 Policy implications

One of the wider aims of the initiative has been to try and link the findings of the project to urban transport policy and suggest some factors that may have an impact upon these policies. Although data has only been collected for one year, the following potential policy implications have emerged from the findings of year one:

- **Average wealth (in terms of GDP per capita) has a subtle influence upon urban transport and the modal choices of the inhabitants of a city**.

  The common indicator analysis revealed that in affluent cities it is common for there to be a tendency towards higher levels of car use and lower levels of public transport use. The common indicator results also demonstrated a strong positive relationship between GDP per capita and the provision of cycling infrastructure, which in turn resulted in higher cycling modal shares. In terms of policy impact these figures suggest that more affluent cities are working against an underlying trend when promoting alternatives to car use. Nonetheless these cities have been able to encourage cycling by investing in extensive cycle path networks. This suggests that a similar approach to public transport and walking could be successfully implemented. It also sends a clear message to cities seeking to develop a culture of cycling that, by investing in safe, segregated cycle lanes, the level of cycling can be increased. As a further development, cities which already display higher levels of cycling could focus upon integrating cycling with other urban transport modes to encourage further cycling and its combined use with motorised modes of urban transport.

- **Cities with populations in excess of 1 million inhabitants can be considered as potential metro cities.**

  As demonstrated by the common indicators, the size of the population of a city has a strong bearing upon the feasibility of constructing a metro system. For the metro-cities involved in the Urban Transport Benchmarking Initiative, the average ratio was 40 km of metro network per 1 million inhabitants. In the case of the cities involved in the benchmarking initiative, Dublin and Warsaw emerged as potential metro-cities based on this threshold.

  Whilst this threshold is approximate and should only be applied by taking into consideration the existing urban transport situation, it does provide a guide for cities considering whether to implement a metro system as an urban transport solution and may influence the formulation of policies regarding urban transport.

- **Demonstrating market awareness makes it possible to target public transport user-groups and appeal to their needs.**

  The behavioural and social issues in public transport working group established that where the public transport marketing effort of cities was strategically organised to target particular age / user–groups it was possible to offer specifically tailored products and services to passengers. The city of Paris provided several good examples of how customer satisfaction surveying and market research activities focused very narrowly upon specific public transport user groups. Although no direct link could be established, Paris also displayed the highest level of public transport modal share of all of the cities that participated in the working group. In Paris public transport ticket offers, such as concessions for young people and links with Euro Disney were planned so that passengers were offered more than "a young person's travel discount card". Focusing upon "Imagin'R", the young person's travel card in Paris, the main offer of reduced

travel was supported by a dedicated website and links to other related products which were designed to appeal to young people. This finding emphasised the need for public transport operators and authorities to be aware of the purpose of customer satisfaction surveying, rather than simply undertaking an annual survey without any clear strategic goals.

This example may have implications for other cities who are seeking to maximise the benefit of customer satisfaction surveying and use the outcomes to develop attractive public transport incentives, which are aiming to increase patronage and to target car users.

- **Using the concept of the "Target Area" helps cities to understand and improve the efficiency of freight flows in the urban environment.**

  The concept of the target area developed by the city logistics working group has the potential to be adopted by other cities seeking to improve their management of urban freight. The participants in the group identified the area of their cities which had the greatest concentration of freight activity. In all cases this area of the city represented the main retail district and, although each participant identified issues specific to their own city (i.e. based on historical nature or land use characteristics), the process of identifying the target area enabled the participants to evaluate the logistical challenges of their cities. An example of the type of output from this process is the freight consolidation centre currently on trial in Bristol and already in operation at Heathrow airport in the UK. It has been possible to trial a solution in Bristol based on an understanding the flows of freight and the impact that disorganised loading and unloading practices had upon traffic congestion within the city.

  The implementation of this useful process could have wider policy implications for other cities keen to rationalise the movement of goods within their city, particularly to key commercial, retail and industrial districts.

- **An integrated approach to promoting cycling as a means of sustainable transport is far more successful than a set of isolated measures.**

  The studies of the cycling working group indicated that the implementation of a range of measures to promote and improve local cycling conditions is a requirement for cities seeking to develop a local cycling culture. The findings of the group emphasised that prevailing political interests play an important role in the development of cycling as a sustainable mode of local transport. Copenhagen is a city where an integrated cycling policy has been pursued with great success. The group noted that it is often difficult to demonstrate a requirement for such integrated schemes and Copenhagen is exceptional because the historic development of the city incorporated bicycles.

  The two key barriers to improving the viability and increasing the uptake of cycling were the development of cycling infrastructure (paths, tracks and signed networks) and the provision of parking facilities for bicycles. In all cities in the group the amount of bicycle parking was deemed to be insufficient. The majority of the participants in the group are trying to address this need with the inclusion of bicycle parking in the planning process. The group also identified the need for an integrated local approach to accommodate cycling and recognise it as a viable mode of local transport. The practices pursued within the group ranged from the development of dedicated cycling information and websites to the integration of cycling with public transport modes.

The key policy implication arising from the research is that a city which is working to encourage cycling should aim to develop an approach which does not focus solely upon one type of scheme. The measures applied in the cities in the group have been most successful where a range of schemes have been combined and applied in an integrated manner. The findings clearly show that constructing cycle lanes or championing the cause of cycling through promotional activities as isolated schemes will more than likely have only a limited impact. In contrast, a strategically devised campaign which offers people the means, information and the encouragement required to cycle safely has proved to be a far greater success. As mentioned above the resources for such schemes are often not available to the degree that they are in Copenhagen. In addition, most cities are starting afresh by trying to introduce cycling, which requires far more effort and patience than where a strong cycling culture already exists.

- **Parking policies linked to development and public transport are important goals for cities seeking to reduce car use in the urban centre.**

  The demand management working group identified that limiting parking spaces for new developments was an important demand management tool, which was used by 5 of the 7 cities participating in the group. Parking policies have a dual impact because they can be used to reduce the number of parking spaces available at new developments, thus encouraging residents / employees to seek alternative modes of transport to the car. In addition, the nature of parking policy provides an indication of a city's stance towards urban transport development and car use in urbanised areas.

  Parking policies linked to development seek to set thresholds for the number of car parking spaces permitted at a new development based upon the number of employees, visitors, or shoppers that will be attracted to the development. This provides the "push" element of the policy because people are deterred from travelling by car due to the scarcity and / or high cost of parking. The "pull" element is provided by policies which link the number of parking spaces available to the provision of public transport at new developments. It is therefore possible for these types of parking policies to influence travel behaviour in a city. However, the rate at which new development takes place can also have a major impact upon the rate of modal shift. It is also possible that only cities of a certain size, or with a sufficient sphere of influence, can successfully implement such policies. This is because in smaller cities, which are possibly not the prime location for new developments, the developers may be deterred by parking limits. The city of Oulu does have policies which determine the number of parking spaces each business should have, but in the city centre most businesses have too few spaces, which has led to the construction of an underground parking area in the centre

  The wider implications of the parking policies researched in the demand management working group are therefore double-edged and require some caution. In larger cities (such as Barcelona or London from within the working group) it may be more feasible to pursue parking policies which seek to limit car use and promote public transport, because the greater density of public transport services means that there will be a viable alternative to car use. In smaller cities such as Oulu, the demand for accessing facilities on the edge of the town by private car has led the local authority to improve and increase car parking facilities in the town centre. This would seemingly contradict most policies of demand management in European urban centres but may be a vital step in revitalising and re-centralising shops and services in the town and may indeed lead to demand for travel by other modes to the city centre.

5.2 Recommendations for improving the benchmarking process in year two

Based upon the experiences of the first year of the Urban Transport Benchmarking Initiative, the following general recommendations can be made in order to attempt to improve the process of benchmarking:

- Certain indicators from the common indicator data set require revision and re-definition, while those indicators that have proved most difficult to collect may be replaced altogether. It is also recommended that the common indicators which have proved the easiest to collect and compare form the basis for a set of "core" indicators. These would be collected for the duration of the Urban Transport Benchmarking Initiative to ensure time-series data which is comparable. This would enable change over time to be monitored and permit data to be updated as it is made available.

- In addition to refining the indicators themselves, the data collection guides and data entry forms should also be reconsidered. Simplifying these documents would make the process of submitting and comparing data more straightforward.

- International links that have been tentatively established during year one of the Urban Transport Benchmarking Initiative could be deepened in scope so that a small number of non-European cities could provide some of the common indicator data. This would provide an interesting comparison between the trends of European and non-European urban transport systems, thus adding value for the participants in the project.

- The potential for an online benchmarking facility should also be considered. Such a facility would enable cities not participating in the initiative to submit items of data into selected scatter-plots to see how their city compares to those that have participated in the initiative. Accessible via the project website, this facility could be a valuable tool in attracting cities to the initiative, as well as aiding the dissemination of the results.

In addition the working groups have each made their own recommendations which are summarised below and are available in full in the working group reports (Annex A2 – A6). The recommendations include:

- Focusing the themes more narrowly should improve the effectiveness of the benchmarking exercise.

- Qualitative information can be equally useful as quantitative information in a benchmarking exercise. Case studies can also be used to share interesting practices with cities that have not been part of the initiative and can outline the problem solving potential and transferability of any interesting practices.

- Refining the common indicators would reduce the overall workload of the project, enabling greater scope for the working groups to collect and compare data.

- Recruitment of more cities is important to improve the processes of sharing information and to enable more cities to learn from each other.

- With the experience from year one, it should be possible to review the working group indicators and improve the comparability of some items of data.

5.3 Next steps and future intentions

The next steps of the project are outlined below;

- Disseminate the first year results to urban transport stakeholders via the project website, European transport networks and conference presentations.

- Perform a review of the progress achieved by other transport benchmarking initiatives and establish links with relevant organisations.

- Allow the outputs of year one of the Urban Transport Benchmarking Initiative to contribute to the review of common indicators.

- Consider the benefit of an interactive benchmarking facility accessible via the project website.

- Promote the year two launch workshop, on 28 September 2004, in order to attract more urban transport stakeholders and potential participants.