CUPID
Co-ordinating
Urban Pricing
Integrated
Demonstrations

CUPID
DELIVERABLE 9
CONFFERENCE REPORT
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## APPENDICES

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1. INTRODUCTION

The final CUPID conference was held on Tuesday 24th February and Wednesday 25th February 2004. The venue for the conference was the Institute of Physics 76 Portland Place in Central London. London was considered to be an ideal location for the conference as Road User Charging has been introduced here just over a year ago.

The conference had a very practical focus and aimed to answer key questions related to planning, putting into operation and managing a Road User Charging Scheme. The results of the PRoGRESS City charging projects were used to disseminate experience and provide best practice on implementing Road User Charging.

Attendance

A total of 140 people attended the conference, of which 84 were external to CUPID or PRoGRESS, and 56 were CUPID/PRoGRESS partners. Figure 1.1 shows the origin of external attendees. The majority of attendees were from European transport consultancies followed by European other businesses and UK other businesses. Universities were well represented with the University of Southampton, the Open University, The University of West of England, Loughborough University from the UK and the Universities of Maribor (Slovenia), Charles University Prague and the University of Gedansk from Europe.

![Figure 1.1 Origin of External Attendees](image)

Attendees to the conference came from 20 different countries; there were external attendees from 17 different countries and another 3 countries were represented by CUPID partners. Figure 1.2 shows the country of origin for external attendees. In total, 42% of external delegates came from the UK 58% came from abroad, mainly Europe (including the Accession Countries). Four delegates came from outside Europe, namely the US, Canada and New Zealand.
The conference was divided in plenary sessions and workshop sessions (see Appendix 1 agenda). The Plenary sessions provided international and technological developments and results from Road Pricing projects of non PRoGRESS cities while at the workshops the PRGoGRESS cities disseminated their results and experiences. There were 3 workshop sessions which were each divided in 2 groups.

The plenary sessions included many eminent speakers such as Ken Livingstone, Mayor of London, Eleni Kopanezou head of the Clean Transport Unit of the European Commission and Magnus Carle, head of the Congestion Charging Secretariat of Stockholm. The final plenary session included a panel discussion with politicians and transport professionals from PRoGRESS cities.

Conference Dinner
The conference dinner was held at the Langham Hilton 1e Portland Place London. The aim of the conference dinner was to provide networking opportunities in a more informal atmosphere. The wide range of nationalities at the conference increased the dissemination of country specific information and expertise on road pricing.

2 PLenary Sessions
The plenary sessions provided an overview of European policy and international, political and technical developments on road pricing in Europe. The Power point presentations of the plenary sessions are attached to this report as appendix 2.

The first presentation was by Alistair Cox, Team Manager Bristol City Council. He gave an overview of the PRoGRESS project which includes Road User Charging Demonstrations in Eight European Cities. The presentation described the activities in each city, the results of these demonstrations and technological issues that arose during the demonstrations.
A number of conclusions have emerged from the demonstrations. There are currently 3 types of charging, A Dedicated Short Range Communications (DSRC) system, Automatic Number Plate Recognition (ANPR) and GPS. All have a number of advantages and disadvantages.

DSRC uses equipment at the roadside to transmit signals to and from electronic units, about the size of an audiocassette tape, fitted on the inside of the windscreen or on the dashboard of vehicles. The advantages of this technology are:

- It is already established technology
- It is currently in operation in Rome and Trondheim and works effectively
- The cost of in car units low
- In vehicle Installation is quick and simple
- Obstacles can occur with gantries

The advantages of ANPR are:

- It has been demonstrated that it can be used for scheme operation/enforcement
- It requires no in vehicle units
- Set up costs are lower but can have higher running costs than GPS/DSRC
- Trials have been conducted in Bristol, Edinburgh, Genoa and Rome

GPS technology includes Vehicles being fitted with a receiver, about the size of a videocassette, which determines location using the Global Positioning System (GPS) satellite network:

- Trials in Bristol, Copenhagen and Gothenburg show positive results
- However, the findings suggest further developmental work is required
- Issues of privacy vary
- Other technological solutions could complement GPS
- Cost of units will affect implementation costs
- Retrofitting entire fleets will be significant task
- The Galileo satellite could improve GPS reception

The demonstrations showed that users preferred electronic payment systems and that clear purpose and objectives are required. The trials also demonstrated that it is important to keep it as simple as
possible to prevent users becoming confused and that the press can heavily influence public opinion.

The second presentation was by Eleni Kopanezou, head of the Clean Transport Unit. She commenced with explaining current transport trends in Europe which indicate increasing growth in urban transport. She then continued with the aims of the Green Paper on Security of Energy Supply which are to reduce energy consumption, increase market share of renewable energies and substitute 20% of road transport fuels by 2020 by alternative fuels (bio-fuels, natural gas, hydrogen). She also explained the main aims of the European Transport Policy for 2010:

- Shifting the balance between modes (from road to rail and maritime, better links)
- Removal of bottlenecks
- Focussing on user-needs (road safety, quality of services - specific urban transport needs)
- Managing the globalisation of transport

Urban transport is for the first time explicitly included in EU transport policy. There are two directives dealing with road transport:

- Directive on charging heavy goods vehicles (revision of ‘Eurovignette’ Directive)
- Directive on electronic charging systems (EFC)

She concluded that for road pricing to be successful you need ambitious politicians and follow an integrated approach. In certain situations radical measures might be needed. The European Commission offers a framework, guidance and support.

Enrico Zanelli, President of POLIS gave a presentation on Public Financing versus Market Pricing. He commenced by explaining the complexity of providing a definition for “public service”. He states that based on common sense the elements of a public service include:

- it must be essential (at the present state of development of our society);
- being essential, it must be provided to all as being affordable;
- consequently, affordability at a basic level is only made possible by public subsidies to the extent necessary to cover the cost of the service that the users (or some of the users) could
not cover on their family budget because of their lower financial station in an unequal society.

He continued on the problems of finding a “fair” way to obtain finance for a subsidized public service. Petrol, which is taxed in most countries, is not really scarce and is used to drive both into Piccadilly Circus and in the most remote countryside. A better approach therefore is to let you pay for your insistence to use scarcity items, to cover the exponential externality costs of such items. He concluded that congestion charging is a fair way to pay for using a scarcity item and at the same time obtain money for public transport.

The keynote speech was held by Ken Livingstone, mayor of London. He discussed the basis of the London Congestion Charging Scheme. The cordon is 21 square kilometres in Central London and is based around a series of roads forming an inner ring road on which there is no charge.

- Upon entry into the zone the charge is £5 (€7) per vehicle per day so more than one trip by the same vehicle is allowed.
- The charging period is from 7am - 6:30pm Monday to Friday and enforcement is conducted by ANPR
- Exemptions to the scheme are emergency vehicles, scheduled bus services and taxis.

Results from the first six months showed that the congestion charging scheme has been a success. On average each day some 65,000 fewer car trips are being made into or through the charging zone. Traffic levels inside the charging zone have reduced by 15%, congestion has reduced by 30%, journey times into central London have reduced by 14% and average network speeds increased by 2.4km compared to 2002.

Improvements have been made to bus services, an additional 560 have been observed entering the zone in the morning peak and an additional 14,000 passengers use bus services in peak hours. He explained that the teething problems with the ANPR system were mainly due to human error of data entry but is now successfully dealt with. After introduction, public opinion shifted from opposing the scheme to being in favour of it.

Mr Livingstone emphasised that the main element of successful introduction of the scheme is political commitment. Such a scheme represents a considerable political risk, and one which can only be taken when it is clear that there is a severe problem to address. He commented that the London political system with an elected mayor is much better geared towards introduction of such a controversial scheme than political systems in other European cities but he hoped that the successful results of London will persuade politicians and residents elsewhere in Europe.

He accepted that there are some concerns over equity and that it was important to recognise that there will be winners and losers. However acceptance of the scheme will increase after implementation, once users are educated in its functions.

He commented on the use of opinion polls, not to guide scheme development, but to understand how to market the scheme to ensure acceptance.

He stressed the importance of using proven technology, and of ensuring that the contract with the scheme operator is devised with care.
Finally, the Mayor explained his plans for the future, and commented on EC plans for interoperability of pricing schemes.

The final plenary session on the first day was an overview of the international perspective on road pricing by Dr Nick Ayland, Managing Director of Transport & Travel research. He commenced by explaining the different types of charging: area licensing, cordon charging, multi cordon and zone charging and distance based charging. He then gave a country by country overview of the main developments including developments in the Far East and the USA.

The main developments in Europe include the London congestion charging zone and Norwegian cities where road pricing has been introduced since the early 90’s. Stockholm has agreed to introduce a trial for a period of 18 this year followed by a referendum on the scheme.

Singapore has had a paper road pricing scheme since 1975 but switched in 1998 to Electronic Road Pricing (ERP). Results show additional traffic reduction of 17 % in the AM peak. In the US charging for use of bridges and individual roads has been around for a number of years but area pricing is not seen as appropriate due to the decentralised land use in many US cities.

He concluded with some key lessons learnt from the international perspective on road pricing. Introduction of road pricing is politically a difficult thing to do and it is very important to have a political champion (such as a mayor). It takes a long time to build up public acceptance and to achieve this clear objectives are essential as are clear statements on what the revenue will be used for. Realistic alternatives and equity issues should be adequately considered before implementation. However, the evidence from existing schemes shows that there is a significant congestion reducing effect.

Eric Sampson of the UK Department for Transport gave a presentation on the interoperability of Road Pricing in Europe. He explained how road charging traditionally developed in a piecemeal way but that toll operators started to realise the benefits of interoperability as it was welcomed by users, cuts costs and increased revenues. He then described the first steps made towards an Interoperability Directive. The directive’s aims were to build a European Electronic Toll Service that will require all operators covered by the scope of the Directive to:

- offer the service for hauliers or coach operators who might want it
- “one contract” for hauliers/coach operators
supply an OBU that is interoperable with all schemes within the Directive
“one bill per period” for all international travel within the Community

The target for implementation is 2009.

The Eurovignette Directive aims to define European road charging for lorries over 3.5 tonnes. The wording is currently still being discussed but it is expected to be on all or parts of the Trans European Network and other roads defined by Member States under subsidiarity principles. How much and on what basis is not certain, whether it will just be recovering the costs of infrastructure provision and maintenance, or also cost of accidents and other externalities like congestion and environmental factors.

The second session on day two was by Magnus Carle, head of the Congestion Charging Secretariat of Stockholm. The Stockholm Municipal Council on 2 June 2003 adopted a majority proposal to introduce congestion charges on a trial basis. The congestion charging zone includes the city centre of Stockholm.

He explained the aims of the Stockholm congestion charging trial. The trial which will include the whole of Stockholm city centre is proposed to start in spring 2005, a referendum will be held after 18 months on whether to make the trial permanent. The objectives of the trial are:

- To reduce traffic volume by 10-15 % on the most heavily used routes during morning and afternoon hours.
- To improve accessibility for buses and cars in the inner city.
- To cut emissions of carbon dioxide, nitrogen oxides and airborne particles in the inner city.
- People in the inner city should experience an improved environment in the city at the street level.

Monitoring work (pre-studies) starts during spring 2004. The trial will be evaluated both on the basis of relevant objectives and on public opinions and views.

The final plenary session of the conference included a Panel Discussion titled “After PRoGRESS”. The panel included politicians and transport professionals from PRoGRESS cities. The included:

- Cllr Helen Holland (Bristol)
- Cllr Arcangelo Merella (Genoa)
- Cllr Andrew Burn, Executive Member for Transport & Public Realm, City of Edinburgh Council
- Maurizio Tomassini, Head of Strategic Marketing and New Initiative, STA (Rome)
- Tore Hoven, Chief Engineer and Head of the Technical Support Unit, Norwegian Public Roads Administration, Central Region of Norway (Oslo)

Panelists were asked to respond to one or more of these questions:

- Following your PRoGRESS road pricing project what is your advice to other cities?
- How will pricing policy developed in the next few years in your city/country
- How will it be in 20 year’s time.
Common elements of advice included the need for political stability. It is therefore best to implement a scheme within one electoral cycle. In addition, there is a need for a high level, national or international champion to press the case for road pricing.

Best practice examples are very effective. Cities like London who have successfully implemented a scheme will give other cities confidence.

Other advice included looking at alternatives before discussing road pricing to present a “do nothing” scenario of increased congestion. It is also important to provide a whole package approach as respondents are more likely to agree with a scheme if they know the money is going to public transport improvements.

Marketing of the scheme is very important to persuade residents of the benefits. It is also important to have key stakeholders (such as traders) in place before introduction of the scheme. Support for a scheme is usually higher after implementation, both London and Trondheim have shown this, so it would be better to avoid a referendum.

All panelists were positive road pricing would move forward and play a larger role in their cities and countries in future years.

3 WORKSHOP SESSIONS

The workshop sessions provided relevant inputs on specific domains of urban road pricing, taking stock of local experiences (namely those included in PRoGRESS). The following themes have been addressed in order to provide answers to the 15 questions raised by CUPID:

- Scheme development & design (WS 1A);
- Social impacts & exemptions (WS 1B);
- Scheme implementation (WS 2A);
- Technology options (WS 2B);
- Framework for delivery (WS 3A);
- Stakeholder consultation and user acceptance (WS 3B).

Whilst the following sub-chapters provide a synthesis on WS results/conclusions, their Power point presentations are attached to this report as appendix 3.
Workshops Session 1 A. Scheme Development & Design

Chair: Dave Milne  Rapporteur: Jens Schade

Presentations from Genoa and Helsinki

General introduction

If charging is considered as one of the solutions for urban traffic problems one of the main issues in the successful implementation of road user charges is the careful development of the concrete scheme. This workshop focused on three important aspects on how to come to a solid scheme development in Genoa and Helsinki:

Where should road users be charged?

This question tackles the issue of how to define the geographic structure for urban pricing. Most urban environments do not have the advantage of e.g. natural boundaries and defining the spatial extent of the system and the precise locations of charging points is likely to be critical to achieving an efficient and fair outcome.

Genoa has tested a cordon pricing scheme in a small (1km²) central area of the city, where users have to pay for entering the historical part of the city. This area includes the old historical centre and involves the heart of commercial activities (shops, business) and the main pedestrians streets.

In Helsinki a distance-based pricing scheme is considered throughout the Helsinki Metropolitan Area, which covers in the whole 740 km².

The presentations of the cities and the following discussion showed that there are no common rules available to define the pricing area. This depends heavily on geography, natural screen lines, and political areas and also on the technology available. Two issues emerged in the discussion: Firstly, that the focus should be on an area with public transport alternatives and secondly, that the pricing boundary should be perceived as somehow fair and rational. However, it was mentioned that these objectives may not be compatible. The examples of Genoa and Helsinki showed also that the pricing area depends on the objectives. In Genoa like in many other historical cities a main aim is to protect the ancient part of the city which means some kind of access pricing. In the contrary in Helsinki congestion and time losses are perceived as the main problems which lead to an approach to cover the whole region.

How much should be paid?

A very important question for several reasons (including acceptability) is how to set charges. Ideally, this should be done following the concept of Marginal Cost Pricing. However, in reality, the identification of road user charges will be a complex task, and, in the short term, will need to reflect a pragmatic compromise between imposing marginal social cost pricing, and the development of a pricing structure which is publicly acceptable and practical to operate. The decision will also reflect the wider objectives of the individual city, which may be more closely related to environmental or financial objectives than to economic theory.
In Genoa at the beginning of the demo a fixed charge of 1 Euro per entry was considered. After the demo this changed to a variable fee of 0.7 – 1.5 Euro per entry depending on time of day, users type, congestion rate, pollution levels, etc..

In Helsinki two options were regarded. Either a fee of 0.1, 0.06 and 0.03 euro/km or alternatively 1.7 euro for crossing towards city centre and 0.85 euro for crossing cross-regional.

The presentations made clear that marginal cost based pricing is not an issue at all in practice. Instead, it was shown that charge levels depend heavily on the objectives of the pricing scheme. In very general terms it came out that revenue raising aims would result in lower fares and demand management aims would result in higher fares. Discussants mentioned that prices should reflect costs (e.g. implementation, operation, capital costs etc.) and practicable tools should be available to calculate these costs. On other approach stressed the view that the charge should be understandable and acceptable, i.e. with reference to a corresponding public transport ticket or to parking fees (ca. 1,5 hours).

How should revenue be used?

The issue of how to use the revenues of road pricing is an important part of the whole scheme implementation. Here questions arise like should the money be hypothecated within the transport sector (i.e. earmarked) or should it be used also for other purposes (e.g. to subsidise general labour or property taxes)?

In Genoa the following purposes for revenue use is considered:

- Management and maintenance of system (about 30%)
- Investments in Public Transport (PT)
- Fare integration with Parking and PT
- Design of Park and Ride schemes at Cordon (with shuttles use)
- Initiatives to support the quality of urban life in target area (area promotion, etc.)
In Helsinki the aim is to finance a regional transport investment package including effective measures for all modes: PT, road, pedestrian & bicycle, and transport related environmental measures.

The presentations and the discussion as well showed clearly that in general the revenues should be left in the transport system. Main rationale behind this is to secure mobility chances and social inclusion for citizens (including traffic safety for all urban modes). A second reason is acceptability issues which show that a majority of car drivers accept transport investments also outside the road sector (e.g. bus, LRT, PT). It was mentioned that revenues should be used in a clear, transparent and credible manner. A major barrier is that for behavioural and attitudinal reasons investments in alternatives like PT should be done in advance. Thus, financial schemes are needed which take into account how to finance these alternatives in advance.
Workshops Session 1 B. Social Impacts & Exemptions

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<th>Rapporteur: Jo Baker</th>
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Who should be charged?

This question was discussed in some detail.

As already suggested by CUPID, the general principle should be to charge all motorised vehicles with the exception of:

- Emergency vehicles
- Public Transport
- Disabled People

Emergency vehicles clearly must be exempt, but in Rome, the presence of a hospital with an active accident and emergency facility within the access-controlled area has required exemptions to be extended to those bringing in a casualty. As a result a mechanism is needed to determine who is a genuine emergency visitor.

Scheduled public transport is clearly exempt. In Rome, however, tourist coaches, which are prevalent in the city are not exempt, and are, in fact, one of the vehicle classes already subject to road user charging. Clearly a city of Rome, whose tourist industry is so well established, is well able to introduce charges which would neither be as significant or acceptable elsewhere.

There is a clear requirement (a legal one in Bristol, as well as a moral one) to maintain access for disabled people, but the mechanism to do this was the subject of discussion. In Rome, each disabled person is able to include 5 vehicle registration numbers on the access “white list”, and also has an exempt On-Board Unit. Clearly this is raises the possibility for abuse, and disabled people comprise a substantial proportion of exemptions. In fact, usage of the right to access by exempt vehicles is very low in proportion to the number of exemptions granted, suggesting that the concession is over-generous, but not so heavily abused.

Other issues discussed were as follows:

- Two-wheelers. There was agreement that at present these needed to be exempt for any ANPR-enforced system. In Rome, especially, the already high number of two-wheelers has continued to rise to enable avoidance of the access restrictions and measures to limit two-wheeler access, particularly to control the most heavily polluting vehicles, are being considered. Therefore this exemption is perhaps one which should be regarded as a pragmatic short-term solution, which may be removed in due course for motorised two-wheelers.
- Clear Vehicles. In Bristol, clean vehicles would be exempt as they are in London. In general, this is a decision driven by the wider policy agenda, and the definition of a clean vehicle will need to be clearly set out.
- Taxis. These will generally be exempt as a part of the transport system, and perhaps an important device to encourage modal shift.
- Residents. In Rome, residents have enjoyed exemption from access restrictions, but this has meant that the ability of the access control scheme to maintain limits on vehicle movements is undermined. Clearly a concession to residents may be needed to achieve acceptance, but this is not a desirable outcome.
- Freight. In Rome, freight movements are exempt as a part of the economic activity of the city. In Bristol, as elsewhere, they would be priced as a key factor in congestion.
- Public servants. In Rome there are methods for public service vehicles to be exempt. This is also a concession open to abuse and one which is probably not desirable elsewhere.

When should road users be charged?

The design of an RUC scheme should reflect peak working hours. In Bristol the scheme would operate only in the morning peak, to intercept the majority of workers, but to avoid any adverse impact on the retail sector. Indeed, such an approach should help to maximise availability of parking spaces for retail visitors.

The design of the scheme should also reflect the availability of public transport and park and ride facilities, and these may influence the operating hours, or perhaps need to be amended to ensure the availability of alternative modes.

Scheme promoters should consider variable tolls. Varying tolls may help to address social issues by differentiating between different trip purposes and vehicles classes.

Road User Charging schemes may need to reflect the permitted loading hours for HGVs, or the definition of such restrictions may need to be integrated within the scheme design.

Overall, it was accepted that any scheme will create winners and losers. Therefore these issues can be assessed to minimise, but not eliminate inequities. Of course, to do this, equity itself must be defined.

Whatever decisions are taken, they must be effectively enforced in order to limit abuse of the scheme. On the other hand, when exemptions are granted, an accessible pre-registration system
must be in place. Similarly, effective mechanisms for use by occasional users (i.e. registration through hotel reception desks) must be provided to avoid visitors becoming de facto exempt.

Both the enforcement and exemptions processes are complicated by increases in the numbers of exemptions and should be simplified, where practical, to minimise scheme complexity and costs. Typically 10% of vehicles (across the whole city) are exempt in Rome, in Bristol the figure is estimated to be 3-5%.

There was some discussion of the scope for tradable permits, rather than exemptions. This was felt to be undesirable, although they are used, illicitly in Rome.

Overall, there is no simple reason why exemptions are granted. The motivation may be legal, technical, operational, economic, or to achieve political consensus.
Workshops Session 2 A. Scheme Implementation

Chair: Terje Tretvik | Rapporteur: Mario Gualdi
Presentations from Rome and Trondheim

What is the best way to introduce road pricing?

Three main issues have been previously identified by CUPID: (i) road pricing as part of a larger transport package, (ii) need of using proven technologies and (iii) partnership as a condition to enable a road pricing scheme.

Both Rome and Trondheim cities agreed that pricing schemes should have clear objectives and, accordingly, its design must respond to those objectives. Political support is crucial to implement road pricing, as well as stakeholders’ acceptance. During all the process, providing information to stakeholders, users and public in general is likely to be a plus in terms of transparency (e.g. identify fair exemption rules, communication of results). Finally, there is also consensus on the need to ensure that pricing schemes are able to cope with and adapt to changing needs/situations, thus making that selection of efficient/reliable technologies a task of major importance.

What is special about your city?

Since road pricing schemes are normally applied in large cities, it is usual to consider them as only applicable in that context. However, specific local conditions may require its adoption by smaller cities in order to tackle efficiently their problems. The following table synthesises the main characteristics of Rome and Trondheim as they influence the adoption of urban road pricing.

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<th>Trondheim</th>
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<td>• Few parking places and metro lines</td>
<td>• Geographically isolated city</td>
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<td>• High motorbike ownership</td>
<td>• Stable political support</td>
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<td>• Non-systematic trips to city centre</td>
<td>• Severe congestion</td>
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<td>• Environmental emergencies (in compliance with regulation EC 99/30)</td>
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What have you learned in the process?

The activities conducted within PRoGRESS have provided relevant lessons on different aspects of urban road pricing implementation. Those can be synthesised in three main fields as follows.

The need to gain earlier political support is a vital condition to go ahead with urban road pricing, being this not confined only at the local level – to have national legislation enabling road pricing and a political agreement with neighbourhood authorities is also important. Furthermore, as stated by Trondheim, to maintain political support even after successful implementation is likely to be a major issue, since a scheme should not be static (e.g. technological updating, new charging levels).

To raise awareness and acceptance of stakeholders and public is crucial, given the opposite interests in place. Thus, setting up a communication strategy is likely to enhance pricing acceptability during a scheme’s life-cycle (including its changes on operation time, charges, etc.), being also of great importance to address different groups affected and to use properly the available tools to communicate. A major issue is related with the use of pricing revenues, being the public usually favourable to the notion that these should be spent on public transport improvements.

Finally, urban road pricing seems to be a very effective demand management tool, although it bears small impacts on modal split (as stated by Trondheim). This can be seen as being one of the reasons to justify the need to allow for delays in implementation and to spend extensive time to refine and consolidate a scheme. To implement road pricing in a gradual/ phased way can be also a solution, like Rome did (Limited Traffic Zones first and road pricing later).
Workshops Session 2 B. **Technology Options**

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**How should road users be charged?**

This will be expected to depend on *scheme objectives* (eg congestion relief vs raising revenue) and on the *technology chosen* (eg lower technology options may preclude more sophisticated charging approaches). A technology-specific sub-question maybe: “is GPS market-ready?”

**How should enforcement operate?**

It is generally accepted that enforcement needs to be perceived as *fair, transparent* and *efficient*. Automatic Number Plate Recognition (ANPR) may be a key component of most enforcement approaches. There also needs to be an effective appeals process for drivers who believe they have been dealt with incorrectly. A case study-specific sub-question would be: “how might individual cities implement enforcement for given road pricing technologies?”

**How can privacy be ensured?**

This may revolve around minimising the amount of data retained. Although privacy has been perceived as one of the key problems of charging technology in the past, it may not be such a big issue now, as people could have become more used to surveillance technology in the world around them. A case study-specific sub-question would be: “are attitudes to privacy changing?”

The two city case study presentations are described in turn.

**Copenhagen**

The Copenhagen case study involved a 500 car trial with GPS technology. Some problems were experienced with the data produced, which in certain cases was clearly wrong. Map matching approaches were used to construct routes, which proved to be a lot of work, but some of this was purely for research purposes & was judged to be beyond the basic requirements for real-life charging. The data set produced was huge and included information on the locations of all stops. The GPS technology encountered many small problems, such as loss of contact with vehicles that travelled in tunnels or parked in underground garage locations, in addition to the traditional issues related to loss of contact in urban canyons. Also, powering up the 3 on-board computers took up to 100 metres. This is excellent for current GPS technology but means that the data does not quite cover complete journeys. The general conclusion was that there are still some issues to overcome before GPS could be implemented in practice.

Enforcement was not an explicit part of the Copenhagen case study, but considering it raises some interesting questions. Are we to assume that every vehicle has to pay? Or that all vehicles have got GPS equipment on board? Or that all the equipment is working properly? And what are the implications for enforcement of a time lag at start up, losses of signal and lack of precision in the GPS data?

Privacy was not considered to be a problem at all in Copenhagen, but the technology was considered to have facilities to provide it if necessary.
**Genoa**

The Genoa case study used Optical Character Recognition (OCR) technology (essentially the same as ANPR) to monitor access to the central area of the city. An error rate of 6-7% was found and system availability was 96.9%.

The best way to charge users was considered to be an integrated system using both OCR and radio frequency technology such as TELEPAS, which has been used on motorways. This would allow payment by bank issued cards using a personal card reader. Such a system is being tested and would involve frequent users being charged from bank accounts and occasional users making direct payments at the roadside.

The precise meaning of enforcement was considered to be an unresolved question. In Genoa, it was considered that drivers who were unequipped and those failing to make a payment would need to be pursued.

On the privacy issue, a distinction was drawn between detection and toll collection. Italian law covers detection of vehicle movements. Toll collection was not considered to be a problem for those paying from bank accounts, because measure exist to ensure privacy. In addition, direct payments at the roadside (in cash) rule out privacy issues altogether. The main concern would be the need for records to verify violations. In general, privacy was not considered to be a problem until somebody made a big issue of it.

**Issues raised during discussion**

- Cost-effectiveness will always drive decisions about technology.
- GPS is less infrastructure intensive than other alternatives and may be likely to gain momentum over time as a result.
- The major strength of GPS in road pricing may be for distance-based charging and, thus, not necessarily in the urban context.
- How are distance-based charges defined under GPS technology? The actual distances travelled by vehicles may be different to those recorded and it is critical that data can be audited to resolve disputes.
- A critical issue is the ratio of installation & operating costs to revenue collected. Costs should really make up no more than 10% for highway systems. The costs for urban systems may be higher than those for inter-urban.
- GPS is not applicable for small scale / low revenue schemes. It is more for national schemes, where it can pay back costs better.
- How enthusiastic is the European Commission on GPS technology? Is the suggested date of 2007/8 for the technology being ready to implement fully optimistic?
- Gallileo signals have been 50% available in cities in the past due to canyons. This may now be up to 90%.
- Many supporters of GPS technology are ignorant of the details & especially the problems.
- Interoperability & standardisation issues remain largely unaddressed.
Workshops Session 3 A. **Framework for Delivery**

<table>
<thead>
<tr>
<th>Chair: Andrea Ricci</th>
<th>Rapporteur: Rosário Macário</th>
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<tbody>
<tr>
<td>Presentations from Trondheim and London</td>
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</table>

**General introduction**

The framework of the workshop has been guided in order to focus on (i) the policy objectives that triggered the decision to undertake a pricing scheme, (ii) its implications for the scheme build up, (iii) assessment of the objectives attainment and (iv) the use of revenues. Added value of cities’ presentations was expected since they have pricing schemes already implemented.

**How should revenue be used?**

London and Trondheim have implemented pricing schemes in order to achieve different objectives: in the first case the basic aim was to reduce congestion, whilst in the later it has been to fund transport-related projects (Trondheim package).

In both cases, there is a common perspective in using charging revenues to finance transport-related projects.

**Why did you start looking at road pricing?**

Due to their different characteristics, London and Trondheim have adopted road pricing in order to achieve different objectives. In London the main reason behind road pricing adoption is related with the high traffic congestion levels observed (the worst in the UK), whilst in Trondheim financing of the local transport investment package has been the main driver of road pricing implementation.

In both cases, road pricing is considered to be part of an integrated strategy to improve the whole transport system and plays a major role in that context. The existence of a toll tradition in Norway and the consensus from public and business that “something had to be done” in London were crucial factors when deciding to adopt road pricing.

**How will you judge whether the scheme is a success?**

Reducing traffic congestion levels and collection of revenues to finance the local transport investment package are the main indicators to assess how successful are the schemes implemented in London and Trondheim, respectively. To have public and business acceptance is also an important issue, as well as to confirm the adequacy and reliability of technological options.

In both cases there is evidence on the success of pricing schemes in terms of the achievement of their original objectives.
Workshops Session 3 B. Stakeholder Consultation & User Acceptance

<table>
<thead>
<tr>
<th>Chair: Jens Schade</th>
<th>Rapporteur: Terje Tretvik</th>
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<tbody>
<tr>
<td>Presentations from Edinburgh and Gothenburg</td>
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</table>

General introduction

The basis for answering the workshop questions was different in the two cities, since they were at different stages in possible implementation path towards urban road pricing. The main objective for Gothenburg has been to evaluate the feasibility of advanced urban road pricing through a field trial. The trial was not intended to lead to a full scale implementation, but to create knowledge and debate around road user charging and to demonstrate the use of new technology.

Edinburgh, on the other hand, finds itself at the end of an extensive consultation and public participation phase, with the aim of full scheme implementation in 2006 of an inner and outer cordon system.

What is the best way to introduce road pricing?

Edinburgh is relying on a six phase consultation strategy. The consultation so far has shown agreement that congestion needs to be reduced, agreement that substantial public transport improvements are required, opposition to the concept of road pricing as a direct traffic restraint measure, improvements in public transport viewed as the best way to reduce congestion and road pricing seen as the preferred means of raising the required revenue.

An interesting difference between the professional and the public way of reasoning has been noted, and that the “package approach” complements the two views. The point of departure for both views is that congestion is a serious problem and needs to be reduced. Whereas the professional then views congestion as being created by road users not paying the full marginal cost of their trip and therefore supports the implementation of a road pricing scheme, the public view is that congestion is caused because many car users do not have an alternative to car travel. Therefore congestion could be reduced by improving public transport, and road pricing could be a revenue source for funding these improvements.

Further implications from the Edinburgh consultations besides the importance of the package approach were the need to implement substantial improvements before road pricing starts, framing the charging proposals, setting charge level and getting the right perspective on conditions in London versus other cities.

The lessons learnt from the trial in Gothenburg were the presentation of facts, the development of the most appropriate scheme from an evaluation of alternatives, undertaking of extensive dialogues with stake holder groups, fine-tuning of design before introduction and constantly being able to adapt to changing conditions.

Why have things not gone in the way planned?

Even though the Edinburgh pricing scheme is still on course for implementation in 2006, the process has been hindered by political instability within the authority and lack of political momentum, distrust of implementing authority’s motives, lack of a powerful champion, significant
opposition from stakeholder groups, commitment to a referendum and difficulty in retaining in-principle support through to the detailed design stages.

A particular concern is that resident opposition for Edinburgh’s proposed charging scheme has been on a steady increase through the various phases, from about 25% in 1999 (Phase I) to about 42% in 2002 (Phase IV). Typical lessons learned are that the total package is too big for people to grasp, that there are too many stakeholders (political, public and governmental sectors), the lack of a national campaign to win hearts and minds (e.g. like the drink diving campaign), and “start off designing a racehorse and end up with a camel”.

Gothenburg had deviations from plan due to technical problems. These consisted of bad quality of GPS reception and loss of signals, loss of battery power, loose plug etc. Because of this an extra test round was needed and a stated-preference exercise on departure time was added.

What are the key factors in your success?

The three words courage, persistence and determination were in general terms the experience from Edinburgh on this topic. More specifically, the following points were noted: Identify high-profile project “champions”, retain on-going dialogue with stakeholder groups, raise awareness of scheme benefits, identify a proposal highlight that can capture public imagination (e.g. new tram system), frame proposals in a manner that is consistent with public acceptance and implement as many improvements as possible before scheme implementation.

General points that were identified from what went well in Gothenburg were information strategy, extensive evaluation, several rounds enabling improvement of technique and the cooperation with city council. It was also noted that on-going activities in Stockholm and London increased the interest in Gothenburg at the final stage of the project.
APPENDIX 1:
AGENDA
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>09.30</td>
<td>Registration</td>
</tr>
<tr>
<td>10:00</td>
<td>Welcome</td>
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<tr>
<td></td>
<td><strong>Session 1: Plenary - The Current State of Play</strong></td>
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<tr>
<td>10:10</td>
<td>PRoGRESS – Road User Charging Demonstrations in Eight European Cities – Alistair Cox, Bristol City Council</td>
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<tr>
<td>10:40</td>
<td>Towards Clean Urban Transport – Eleni Kopsenezou, Head of Unit, European Commission, Directorate-General for Energy and Transport</td>
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<tr>
<td>11:00</td>
<td>A Dilemma for Local Transport: Public Financing or Market Pricing – Enrico Zanelli, President of POLIS</td>
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<td>11:10</td>
<td>Coffee</td>
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<tr>
<td>11:40</td>
<td>London: A Year On – Ken Livingstone, Mayor of London</td>
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<tr>
<td>12:10</td>
<td>The International Perspective – Dr Nick Ayland, Transport &amp; Travel Research Ltd</td>
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<tr>
<td>12:30</td>
<td>Questions and Discussion</td>
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<tr>
<td>13:00</td>
<td>Lunch</td>
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<td><strong>Session 2: The Lessons Learnt – Workshops Part 1</strong></td>
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<tr>
<td>14:00</td>
<td>Workshop Session 1</td>
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<tr>
<td></td>
<td>A. Scheme Development &amp; Design</td>
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<td>B. Social Impacts &amp; Exemptions</td>
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<tr>
<td>15:10</td>
<td>Coffee</td>
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<tr>
<td>15:30</td>
<td>Workshop Session 2</td>
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<tr>
<td></td>
<td>A. SCHEME IMPLEMENTATION</td>
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<td>B. Technology Options</td>
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<tr>
<td>16:40</td>
<td>Workshop feedback</td>
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<td>17:00</td>
<td>First day closes</td>
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<tr>
<td>Time</td>
<td>Session/Activity</td>
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<tr>
<td>09:00</td>
<td>Coffee</td>
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<tr>
<td>09:30</td>
<td>Welcome from the Chairman</td>
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</table>

**Session 3: The Lessons Learnt – Workshops Part II**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>09:40</td>
<td>Workshop Session 3</td>
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<tr>
<td>10:50</td>
<td>Coffee</td>
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<tr>
<td>11:10</td>
<td>Workshop Feedback</td>
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<tr>
<td>11:20</td>
<td>Discussion</td>
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<td>12:00</td>
<td>Lunch</td>
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**Session 4: Plenary – The Way Forward**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>13:00</td>
<td>Towards Interoperability in Europe – Eric Sampson, Department for Transport, UK</td>
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<tr>
<td>13:20</td>
<td>Stockholm's Story – Magnus Carle, Stockholm, Sweden</td>
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<tr>
<td>13:40</td>
<td>Panel Discussion: After PRoGRÆSS</td>
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<td></td>
<td>With Cllr Helen Holland (Bristol), Cllr Arcangelo Merella (Genoa), Cllr Andrew Burns (Edinburgh), Maurizio Tomassini (Rome) and Tore Hoven (Oslo)</td>
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<tr>
<td>14:40</td>
<td>Chair’s final words</td>
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<tr>
<td>15:00</td>
<td>CONFERENCE CLOSES</td>
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</tbody>
</table>
APPENDIX 2:
POWERPOINT PRESENTATIONS
PLENARY SESSIONS
POWERPOINT PRESENTATIONS
PLENARY SESSIONS

1. Alistair Cox, Bristol City Council - PRoGRESS – Road User Charging
   Demonstrations in Eight European Cities

2. Eleni Kopanezou, Head of Unit, European Commission, Directorate-General for
   Energy and Transport - Towards Clean Urban Transport

3. Dr Nick Ayland, Transport & Travel Research Ltd - The International Perspective

4. Eric Sampson, Department for Transport, UK - Towards Interoperability in Europe

5. Magnus Carle, Stockholm, Sweden - Stockholm’s Story
APPENDIX 3:
POWERPOINT PRESENTATIONS
WORKSHOPS
POWERPOINT PRESENTATIONS WORKSHOPS

1A Genoa
1A Helsinki
1B Bristol
1B Rome
2A Rome
2A Trondheim
2B Copenhagen
2B Genoa
3A Trondheim
3A TfL
3B Edinburgh
3B Gothenburg