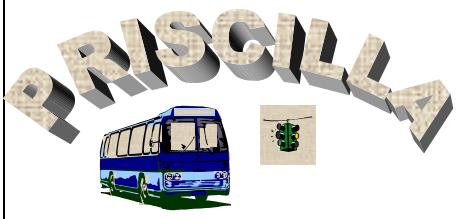

PRISCILLA

IST-1999-20222

BUS PRIORITY STRATEGIES AND IMPACT SCENARIOS

DEVELOPED ON A LARGE URBAN AREA

DELIVERABLE 6

FINAL REPORT

Report Version:	2.0
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Glossary of terms used

AVL	Automatic Vehicle Location. A system that continuously tracks the location of buses.
UTC	Urban Traffic Control. A centralised system that controls and co-ordinates a network of traffic signals.
ITS	Intelligent Transport Systems. A generic term for systems that are considered in some way to be 'intelligent' or use high-technology.
GPS	Global Positioning System. Location of vehicles using satellite technology.
Headway	The time gaps between buses. Normally used in measuring the time spacing between different buses running on the same route.
Punctuality	The extent to which a bus is on time, early or late; the difference between the actual arrival time and the scheduled arrival time.
Regularity	A measure of how well spaced out the buses are. Regularity is optimal when all the buses on a route have the same headway.
Differential priority	Any priority strategy where different buses receive different priority levels according to some criterion (such as punctuality).

1) PROJECT OVERVIEW

MAIN ACHIEVEMENTS

The main achievements coming out from the project derive from the main deliverables (state of the art review, evaluation results and best practice guide) and from the broader dissemination activities in CEEC.

State of the art review

- The need to support public transport and provide efficient operating conditions is recognised in cities throughout the world. Buses play a key role in public transport provision, and their ability to transport high volumes of passengers justifies the provision of priority relative to private traffic. This policy has been shown to be widespread at the European, national and local levels.

- This review has demonstrated that there is substantial evidence of the effectiveness of bus priority across a range of applications. In this situation, many cities with limited applications of bus priority will wish to expand city-wide, whilst other cities without bus priority may wish to procure a system. There are clearly a large range of issues to be considered by decision-makers, not the least of which is how to specify and select a system given the particular network, traffic and bus operating characteristics of their city and the 'legacy' systems which exist.

- Bus priority can be achieved through a variety of techniques, including segregated systems, traffic management and priority at traffic signals. Each has its own role in specific situations, and combinations of measures can be particularly effective. Bus priority at traffic signals has the particular advantages relative to physical measures of cost effectiveness, flexibility and high driver compliance. The substantial advances in Information Technology are also providing opportunities for advanced detection, control and priority systems, which further benefit public transport.

- A wide range of system architectures is being used for bus priority in cities around the world. In general, systems are evolving in complexity and functionality, from transponder/tag based systems providing 'local' priority to all buses, to more integrated AVL/UTC systems. The latter systems often offer real-time fleet management, passenger information at bus stops and 'differential' priority for buses

at traffic signals, seeking to improve bus regularity and reliability, as well as increasing operating speeds.

- There is a clear trend for an increasing use of Global Positioning System (GPS) technology to perform the bus location function. GPS provides a potentially cost-effective and flexible solution for bus location. For traffic signal control, most cities are already committed to a particular type of Urban Traffic Control (UTC) system, and bus priority then has to be integrated into it in the most efficient manner.

- There is strong evidence from a variety of surveys around the world that bus priority at traffic signals can provide good operational and economic benefits when conditions are favourable. Bus delay and regularity improvements can often pay for implementation costs within one or two years, with strategies able to cause minimal impact on general traffic. However, a wide range of results has been reported and some cases have occurred where benefits have not been achieved. Further evaluation of factors affecting benefits is recommended.

- This review has indicated that Europe is leading the way with advanced, integrated systems for bus priority at traffic signals, and the systems being deployed/evaluated in PRISCILLA are at the leading-edge of those available. It is noted from the review that most cities are extending their bus priority sytems incrementally, using local priority actions, albeit sometimes controlled by UTC. There is little evidence of network wide strategic approaches being taken, as proposed in PRISCILLA.

- Simulation modelling is seen as an important aid to pre-implementation assessment.

- Evaluations based on field trials have sometimes been limited in their coverage of impacts and in their statistical significance.

- A wide and expanding range of system architectures have been identified. A comparative review is therefore proposed of the options identified, to draw out the relative merits of each option in different circumstances, and to address the issue of standards and transferability.

- There is a wide range of reported results of system performance/impacts. Factors such as system attributes, strategy selection and application context could contribute to recommendations for the selection process for systems, strategies and sites.

- It has become apparent in this review that different institutional and operational 'models' which apply to different cities can significantly affect the implementation options and commitment to bus priority.

- Overall, the review has reinforced the importance of PRISCILLA, in taking a network-wide view of bus priority, rather than the 'piecemeal' application that has often been taken to date, and in having a strong emphasis on evaluation, to provide robust results to take forward. In this report, the combination of field trials and simulation in PRISCILLA is seen to be particularly important.

Evaluation results

- Benefits of the strategies, in terms of travel times and punctuality are favourable and induce a real improvement of the service quality offered to the final users.

- It appears (mainly in Toulouse) that a lot of hardware and software tools needed for the implementation of the bus priority exist when the site is already equipped with modern UTC and AVL System (particularly when real-time information is provided to the users).

- It does not appear that the deployment of the system from a small scale to a wide scale may present major technical difficulties.

- Bus priority only focuses on traffic signal junctions; it is important to also consider what happens at bus stops and on the links between the junctions. Bus priority is only one of the means that can be used for the improvement of the bus network.

- The experimentation in Toulouse has shown that, during the period when the traffic is highly perturbed by unusual events, bus priority has no positive impact.

- Both in Genoa and Toulouse (and for several different reasons) about 30% of the data, that are automatically collected by the different subsystems (on board or at the control centre), are not usable for the analysis. Even if the sample size obtained is greatly sufficient for a provision of statistically acceptable data, that means that improvements can be done in the functioning of the systems.

- There is a high sensitivity of the results to local characteristics of the site (for instance, the location of the bus stops or the traffic lights functioning). As a consequence, there is a need of accurate study of each junction before the

implementation of the system. Another consequence is that the system needs, to be carefully monitored after its implementation. People in charge of the system have to build indicators allowing to follow its functioning. The software tools developed, for this purpose, in Genoa may be a good example of what can be done in this area.

- In the perspective of an operational wide scale implementation, it is very useful to have in board equipment on buses to allow collection of data for the analysis of the functioning of the bus priority system.
- The setting of the traffic lights is an important task and needs sufficient human resources.
- In the analysis of the results, statistical methods have to be used for the evaluation of the statistical validity of the data.
- The SPLIT simulation model is a useful tool able to investigate a wide range of strategies. The simulation results show that the differential priority strategies, i.e. those that target priority for late buses, are optimal, as they provide a good balance between travel time savings and passenger waiting time savings.
- The simulation also results show that full priority to all buses is not recommended due to the negative impact on non-priority traffic and since this does not generally improve the headway regularity of the bus service.
- These simulation results also indicate that the headway-based priority method gave modest benefits over the schedule-based priority method both in terms of bus passenger travel time and in passenger waiting time.
- The indicator "Commercial travel time" is a pertinent indicator for the final user. However it includes a lot of delays between the junctions which have nothing to do with bus priority; in that sense one can say that this indicator is an indirect indicator of the bus priority impact. The consequence is that, generally, the benefits in terms of commercial travel times are limited between 5% and 15%.
- Crossing speeds are one of the significant indicators for the evaluation of a bus priority system, because it does not include, in most of the cases, any influence of the incidents between the junctions. Large benefits (up to 20%) have been obtained on particular lines.

- The punctuality indicator computed in Toulouse and Genoa is pertinent for a comparison, on one site, of different strategies or different lines. It is not pertinent for a comparison between different sites because it is greatly sensitive to the accuracy of the theoretical time-table. The best results have been obtained in Genoa (benefits in terms of punctuality often higher than 20%).

- For further experimentations, the automatically collected data dealing with punctuality would be usefully complemented by data collected at bus stops about the gap between two following buses. But it is clear that these surveys would need considerable resources in order to obtain statistically acceptable results.

- Bus drivers have a general good feeling of the system, even in some cases (Toulouse) where the general conditions of the traffic do not allow a clear perception of the benefits.

- The cost-benefits analysis show that the first year of return is favourable, mainly in Toulouse because the investments costs are very low.

Best Practice Guide

- System feasibility – For bus priority at traffic signals to be feasible it is essential to have political support to provide priority to buses, perhaps at the expense of private traffic, backed up by adequate funding and commitment and co-operation from the authorities and bus service providers who would be involved in running the system.

- System design options – There are many system options available for implementing bus priority at traffic signals and no one option can be considered to be 'best'. It is important that the system requirements are specified in detail and that the simplest option meeting the system requirements is chosen with scope for future expansion and enhancements. Simple systems will be easier to install and maintain.

- Strategy options – A variety of priority strategies can be used such as improving bus service speeds by providing priority to all buses, improving bus service punctuality or regularity by providing 'differential' priority, where different buses receive different levels of priority according to their punctuality/regularity at the time, or varying the level of priority provided, according to benefits sought and levels of disbenefit acceptable for non-priority traffic.

- Pre-evaluation – Before purchase and installation of any system it is recommended that the anticipated benefits and control strategy options be assessed. This may be achieved through examination of similar systems that have been used in other cities, where these exist and have been evaluated robustly. Simulation modelling is also recommended to allow evaluation of the bus priority actions in a controlled environment. S

- System implementation – This is the most strategic task and requires considerable time and effort in both planning and undertaking the required work. This work includes system procurement, negotiation of work to be done, allocation of roles and responsibilities, installation, testing and tuning of equipment. Co-operation between the project partners is essential to successful implementation of a bus priority system.

- Evaluation – The installed bus priority system needs to be evaluated for its technical performance and its effectiveness for providing benefits to bus passengers and its impact on general traffic. Robust and statistically rigorous methods are required. Evaluation is greatly aided by automatic data collection procedures and system diagnostic tools. Field trials should be designed to measure the main performance indicators of bus travel time, bus headway regularity (which is highly correlated with bus passengers waiting times at bus stops), and delay to general traffic. These impacts can then be converted into economic benefits/disbenefits to compare against system implementation, operation and maintenance costs.

- Maintenance – It is vital that sufficient human and financial resources are in place to keep the bus priority system working well. Without this commitment, the system is likely to become inefficient and, possibly, ineffective. Bus timetables, where used by the bus priority system, need to be updated as changes are made. Operational tests should be made at regular intervals to ensure that the system is behaving as it should.

- System expansion – System expansion to other areas of the city network is only recommended once the user has confidence that the system is working correctly on the current network. It should be appreciated that system expansion will not only involve work in setting up the new routes and sites but will also increase the workload for maintenance. System expansion could also include additional

functionality (e.g. passenger information or fleet management). This possibility should be considered at the system functional specification stage.

CEEC dissemination

The two PRISCILLA workshops dedicated to CEEC held in Prague and Budapest have been attended by many actors involved in bus priority systems: from local authorities to public transport operators and industrial providers. At least a good awareness on ITS systems have been achieved and many local authorities have shown interest in developing ITS-based applications like AVM or UTC systems.

In particular, as main results of the dedicated dissemination developed in Romania, it is clear that the state of the art in Romania concerning public transport priority systems in traffic is no more the same as it was described within Deliverable D2, in the beginning of the project. According to the four presentations within the second workshop in Bucharest, there are some larger cities in Romania (Arad, Bucharest, Ploiesti and Timisoara) thinking about this issue and acting for coming to a certain strategy in order to take benefit of such systems within their public transport network. Both public transport operators and local authorities have started investigations in finding best solutions for monitoring the traffic, including public transport network. Some of them have started with technical project of achieving first a corresponding Automatic Vehicle Location system, taking into account only one line of public transport vehicles: i.e. buses in Ploiesti city and trolley buses in Timisoara City. They have managed to monitor only partially a few public transport vehicles that is 7 buses in Ploiesti and 4 trolley buses in Timisoara, mainly because of financial resources lack. In Bucharest there is a technical project managed by the public transport operator of Bucharest, RATB, for achieving the traffic management on line of trams 41 of about 9kms. This project will register the first results as well as the impact on public transport trams (punctuality, commercial speed, time travelling and other indicators) to the end of 2002 when the project will be finalised.

CONSORTIUM COMPOSITION AND PARTNER ROLES

The city of Genoa (Italy) as co-ordinator, the city / county of Southampton / Hampshire (United Kingdom) and the city of Toulouse, formed a significant consortium based on their fine understanding in technical and political objectives and their expertise in EU projects. Each of the three local consortium has been led by local public authorities [Azienda Mobilità e Trasporti, Southampton City Council, Marie de Toulouse and SMTC (Toulouse Authority for Public Transport)], that means an high level political support guaranteed the implementation of the envisaged technologies on a large scale, together with their respective industrial partners (Elsag and Siemens) and with the assistance of two research/laboratory centres (Transport Research Group of the University of Southampton, ZELT (CETE) in Toulouse). The presence of a national Public Transport Association (URTP-Romania) guaranteed a big exploitation potential inside the consortium in a promising Eastern Europe nation concerning Intelligent Transport Systems development.

The partners of PRISCILLA complement each other through the significant amount of experiences and technical expertise in the consortium (combining experts from national and local authorities, public services suppliers, research centres, industries) and the substantial experience in European co-operation.

Complementarity of the project participants have been taken into account: the "users" members are specially involved in the dissemination phase where their contribution is used to reflect and distribute the project's results on Public Transport users; the private industrial "suppliers" are specially involved in the measurement phase to contribute to the fine tuning of their technologies following the best practise adopted and in the exploitation phase in order to verify the feasibility of a large adoption of these kinds of systems; the researchers are mainly involved in reviewing current best practice, in the definition of the measurement and evaluation plans and in the consequent evaluation of results.

Role in the project	N	Participant name	Short name	Country	Status
Project co-ordination Leader of Genoa local consortium	1	Azienda Mobilità e Trasporti SpA	AMT	I	Principal Contractor (coordinator)
Industrial supplier for Genoa applications	2	Elsag	ELSAG	I	Member
Leader of UK local consortium Leader of WP on dissemination	3	Southampton City Council	SCC	UK	Principal Contractor
UK partner especially for potential exploitation in peripheral areas	4	Hampshire County Council	HCC	UK	Member
Industrial supplier for UK applications	5	Siemens Traffic Controls Ltd	STCL	UK	Member
UK partner for simulation activities	6	University of Southampton (Transportation Research Group)	TRG	UK	Member
Dissemination/exploitation at national level	7	Romanian Union of Public Transport	URTP	Romania	Member
Leader of F local consortium	8	Mairie de Toulouse	MDT	F	Principal Contractor
Authority for the definition of the overall bus priority policies	9	Syndicat Mixte des Transports en Commun de l'Agglomération Toulousaine	SMTC	F	Member
F Public transport operator	10	Société d'Economie Mixte des Voyageurs de l'Agglomération Toulousaine	SEMVAT	F	Member
Leader of the evaluation phase	11	Centre d'Etudes Techniques de l'Equipement du Sud-Ouest*	ZELT	F	Member

2) PROJECT OBJECTIVES

All the 3 "users" cities (Genoa, Southampton and Toulouse) and the two industrial "suppliers" (Elsag and Siemens) involved in PRISCILLA have gained a great deal of experience in bus priority also being involved in several EU R&D projects (PROMPT, EUROSCOPE, INCOME, CENTAUR, QUARTET PLUS, ANTARES, MOBISERVICE ….). However, at the beginning of the project bus priority couldn't be considered fully mature in large urban areas (100-400 buses, 80-150 intersections, city centre and suburbs,…..). The project is about bus priority in a centralised environment linking the two control systems (Urban Traffic Control for trafficlights control and Automatic Vehicle Monitoring for bus fleet management) taking into account the different individual strategies that can be implemented in the two control centres.

Starting from this state of the art the scientific and technological the ***overall goal*** is the ***demonstration of the benefits of best practice adoption of wide network bus priority strategies***. More particularly to boost the take up of existing bus priority technologies and methodologies / strategies (practices and processes) by developing them from small scale to wide networks and to produce and disseminate the lessons learnt about best practice adoption of wide are bus priority systems.

The operational goals are the followings.

(a) *To define PT priority control strategies to be tested and adapt to the technological and organisational issues raised by the extension of the systems currently validated on a small scale to a wide city area*.

The effects of a generalised management of the priority functions on the traffic in a dense public and private transport network cannot be foreseen without due experimentation and, certainly, may be very different from the targeted ones, especially regarding the compromise between benefits for the public transport and penalisation of the private transport. Advanced priority control strategies have been defined and adopted, based on existing infrastructures and technologies, to optimise bus operations for complete bus routes and for the network as a whole.

(b) *To test different control objectives and to evaluate the main impacts of the related strategies (in terms of bus commercial speed, bus punctuality, private car travel time, acceptance of the professional users, and socio economic analysis)*.

The mean to achieve the testing of the control objectives is the realisation of the measurement phase in which after the definition of the objectives to follow (i.e. collecting data without bus priority, decreasing travel time, maintaining timetables at the main stop points,….) there have been the implementation of the related strategies to put in practise on wide networks with a high number of junctions and buses and very close intersections. Measurements in Southampton has been realised by simulation modelling over the same network segments, providing results compatible with the field trials (impacts, evaluation criteria, etc.) but including also testing of a wider range of scenarios and priority control strategies.

The evaluation of the related effects and impacts has been reached through a common evaluation plan, ensuring a consistency in impacts measured, even if the timing of the trials and the measurement methods may vary between sites. Maximum use has been made of existing automatic data recording facilities in the AVL and UTC centres.

(c) *To disseminate the results and plan their exploitation*.

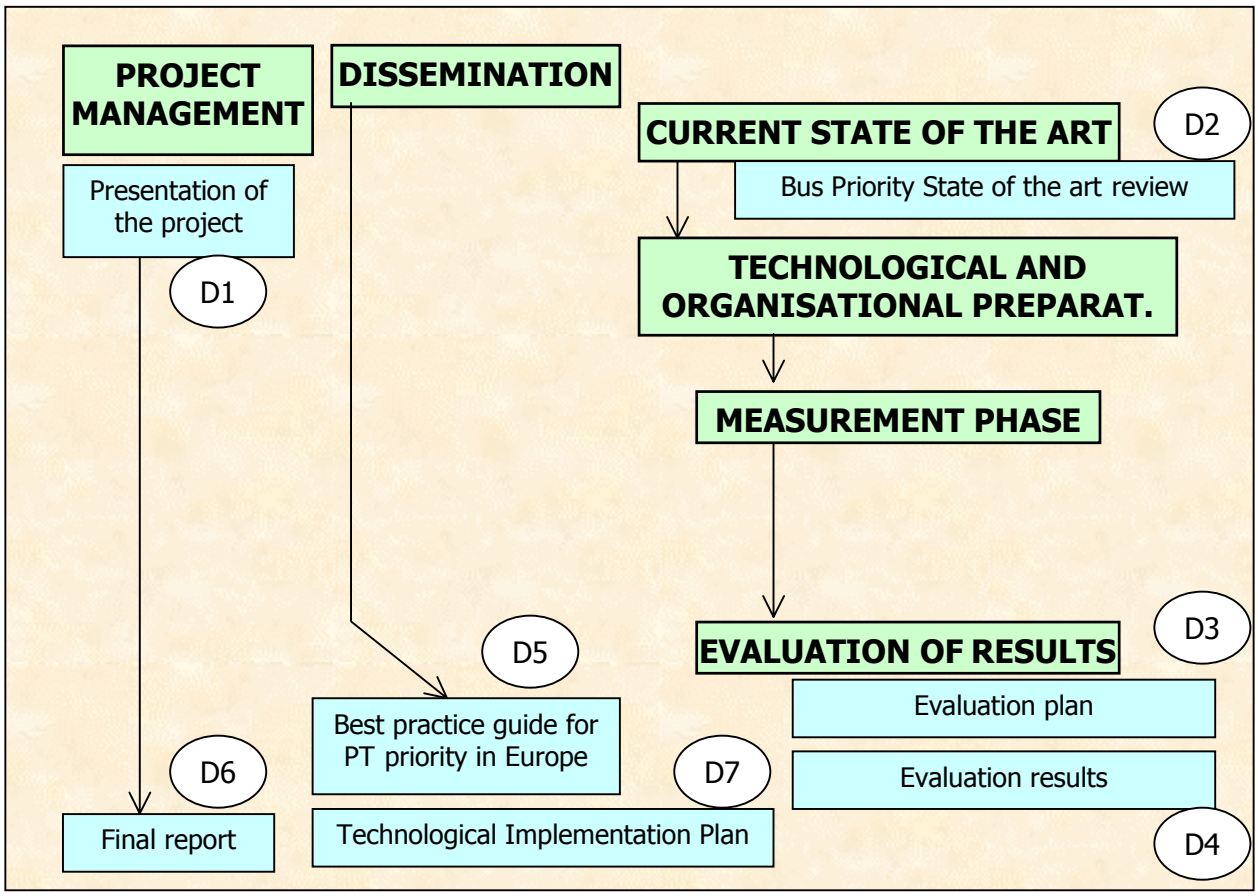
The dissemination activities are designed to exchange experiences, exploit synergies and expand the efforts of the various players so as to reach a critical mass (broad dissemination of results, awareness creation and stimulation of technology transfer on a thematic, regional, or industrial / service sector level) and are targeted at local level, at European level and especially targeted for Central and Eastern European Countries (CEEC).

The partners in networks such POLIS will amplify the benefits obtained from the project.

3) APPROACH

PRISCILLA is originally a 20-months project, then extended to 23 months, with a specific focused experiment (Measurement phase). The following diagram and table show the WP structure (green boxes contain Workpackages, blue boxes contains Deliverables); also the Deliverable structure is very easy and focused.

WP	Workpackage title	Deliverable No
WP 1	Project Management	D1 D6
WP 2	Current state of the art	D2
WP 3	Technological and organisational preparation	
WP 4	Measurement	
WP 5	Assessment and evaluation	D3 D4
WP 6	Dissemination & Use	D5 D7



The workplan has been split into six different workpackages:

WP1 - Project Management

WP2 - Current state of the art

WP3 - Technological and organisational preparation

WP4 - Measurement

WP5 - Assessment and Evaluation

WP6 - Dissemination & Use

WP1 and *WP6* (*Project Management and Dissemination*) are horizontal activities covering all the life cycle of the project. PRISCILLA started with the preparation of the first deliverable ***D1-Presentation of the project*** in which the project is briefly described in order to let the overall work plan objectives clear also to non specialists. Following D1, *WP2 – Current state of the art* analysed the experiences of the introduction of bus/tram priority systems in European cities, giving a first input to the best practice guide and to the evaluation and measurement plan through its deliverable ***D2 – PT priority state of the art review.***

The *WP5 – Assessment and evaluation* included all the activities related to the validation of the applications, producing a first deliverable at the beginning of the project ***D3 – Evaluation plan***, containing the measurement plan, and a second deliverable after the trials ***D4 – Evaluation results*** that is one of the main output of the project.

The *WP3 - Technological and organisational preparation* covers all the adjustments (i.e. extension of radio network, hardware and software adaptation, definition of all the parameters, technical validation of the systems…) needed to put in practice the measurement plan (6 months trials) covered by *WP4 – measurement phase* in which different strategies have been tested following the same methodological approach, including the simulation activities in Southampton. The other horizontal activities in the work plan is *WP6 - Dissemination & Use* that has been carried on all over the life cycle of the project, producing, at the end of the project ***D5 - Best practice for PT priority in Europe.*** and ***D7- Technology Implementation Plan (TIP)*** indicating exploitation intentions and containing a transferability analysis.

D6 - Final Report covers all the work, objectives, results and conclusions on the project.

4) PROJECT RESULTS

PROJECT ASSESSMENT (OBJECTIVES VERSUS RESULTS OBTAINED)

The project assessment is the assessment of the level of achievement of the planned objectives as a part of the Work Package "Evaluation and Assessment"; in the following table a first column recalls the objectives of the project, a second column contains the questions to be answered in order to assess in what extent the project has been successful and a third column contains the answers to the previous questions.

OBJECTIVES OF THE PRISCILLA PROJECT	MEASURE OF SUCCESS	ANSWERS
To define PT priority strategies, and to adapt the existing systems in order to make them usable for these strategies in a wide city area	A consensus about strategies has been obtained?	The systems have been fully adapted to the strategies. Different strategies have produced different results, with main common results that are discussed in the evaluation results chapter.
	The existing system has been adapted to these strategies?	
	Ratio between the number of buses, lines and intersections equipped and the number planned.	Around 95% as an average value. In some cases more than 100%.
To measure the impacts of the system in terms of commercial speed and regularity of buses, and travel time of private cars	Has a common Impact Assessment Framework been used (including a common list of indicators)?	Yes
	Do the data collected provide results statistically validated?	Yes, for details look to the specific chapter of D4 Evaluation Results
	Do the results allow a clear view of the benefits, in terms of impacts? Do the evaluation results show positive impacts?	Yes in terms of increasing junction crossing time, partly in terms of average speed of the buses and delay for private traffic.

OBJECTIVES OF THE PRISCILLA PROJECT	MEASURE OF SUCCESS	ANSWERS
To measure the acceptance of professional users	Has it been possible to investigate all the expected categories of professional users (bus drivers, UTC Operators, PT Operators)?	Yes, mainly through user acceptance workshop. For details look to the specific chapter of D4 Evaluation Results
	Was the attendance to the local workshop representative of these users?	Yes
	Was a common framework used?	No, in the field trial sites Genoa and Toulouse used the same approach but with a different structure in number and content of the meetings. In Southampton only the UTC operators have been involved.
	Are the results of the workshop usable?	Yes, in terms of feedback gained from the professional users the expertise learnt has been used as an input to several paragraph of D5 Best Practice Guide.
To perform a Cost-Benefit Analysis	Has a common Methodology been used?	Yes, for details look to the specific chapter of D3 Evaluation Plan
	Has the CBA a positive result?	Yes, for details look to the specific chapter of D4 Evaluation Results.
To disseminate the results	Has a Web project report been provided?	Yes
	In how many conferences or workshops has the project been presented?	The project has been presented in many local, national and international events. (see detailed list in the management reports)
	How many articles have been written?	Some articles have been written about the project (see detailed list in the management reports)
	How many events dealing with CEEC?	At least 4 dedicated events have been organised in CEEC (two in Romania, one in Czech Republic and one in Hungary)
	What are the expected uses of the PRISCILLA results?	The Best Practice guide might be very useful in guiding a bus priority development in each stage. It can also be used as reference for the other deliverables and results obtained in the project.

TECHNOLOGICAL INNOVATION

In the framework of the IST Workprogramme PRISCILLA supports *key action 1 "systems and services for the citizens*" reflecting several of the main overall objectives of the actual Work Programme like promoting better quality of public services, improving integration and convergence across information processing and providing new models of public service provision. In Key action 1 PRISCILLA supports *action line 6.1 "intelligent transport infrastructure and mobility Management"*. The focus of PRISCILLA is on the take up of a general interest service that, by the large dissemination of its "best practice guidebook", will strongly contribute to the applications development; in particular PRISCILLA supports those aspects of service development that should also strengthen the global competitiveness of the involved industries.

The systems / technologies / methodologies taken up by PRISCILLA are clearly in relation to the development of intelligent infrastructures for data capture (bus location),processing (on buses, at trafficlights), exchange and distribution (data exchanged between control centres). Bus priority strategies on wide areas might also strongly support traffic management (procedures/strategies exchanged between control centres) and collective transport and fleet operations (management support for the Public Transport operators in Genoa, Southampton and Toulouse)

The core of priority systems is bus location; emphasis is therefore clearly placed on the enhancement of positioning and navigation systems (terrestrial and satellite communication for their adaptation for traffic control, tracking and tracing). Following another action line goal the work undertaken in PRISCILLA includes the take up of traffic control systems (integrating processing, prediction and decision-support tools) in order to help put in practice bus priority strategies on a wide area.

COMMUNITY ADDED VALUE AND CONTRIBUTION TO EU POLICIES

PRISCILLA's added value at EU level mainly occurs through the production of the "Best practice guidelines for public transport priority in Europe" drawn from the trials and by the related dissemination / exploitation of results for up take bus priority city wide as well as analyse the potential transferability of this ITS application.

The previous successful EU projects developed in the partners cities, together with the commitment shown by the local authorities, allowed the project to reach a national and world-wide interest as demonstrated by all the international events in which the project has been presented. The European dimension and the related EU added value of the project is due to the fact that the work realised in PRISCILLA is not all feasible at national level as this would involve only one public transport context; to this aim the project contributes through the demonstration of the benefits of best practice adoption of wide area bus priority strategies through a controlled, limited and well focused experiment (implementation of 6 months of measurements) and the formulation of best practice guidance in order to transfer experiences for both internal and external reuse establishing potential for replication wherever a bus priority application might be developed and especially in CEEC.

Bringing together complementary expertise from the different participating organisations the European dimension of the consortium is clear. The project is led by advanced cities in Europe concerning transport policy and technologies implementation (Genoa, Southampton and Toulouse); these cities include membership of the POLIS network (Genoa is currently also a member of the Management Committee) which ensures dissemination activities on an adequate European level; the high profile of the industrial suppliers involved (Elsag and Siemens) ensures a big potential for exploitation; from the methodological point of view the expertise coming from the Transport Research Group of the University of Southampton and from ZELT assures a well defined approach following previous methodologies developed in other EU research projects; the participation of the Romanian Public Transport Association (URTP) ensures an exploitation activities not only in one city but involving directly in the consortium an entire nation; the dedicated CEEC dissemination of the PRISCILLA results is definitively contributing to the increased use of Intelligent Transport Systems in Eastern Europe.

Concerning implementation and evolution of EU policies PRISCILLA is clearly contributing to the key challenge about how to reconcile the increased demand for transport with the need to reduce its impact on the physical, social and human environment. It is therefore clear that PRISCILLA helps the European Union to further develop and implement the objectives of the Common Transport Policy and those of national transport policies promoting transport sustainability from an economic, social and environmental point of view and enhancing the efficiency and quality of transport systems and services.

PRISCILLA also supports the Community policy in the field of information technologies and second-generation satellite navigation and positioning systems in the transport sector and other Community policies in such fields as energy, industry, environment, employment in co-ordination with other key actions of the Fifth Framework Programme.

The project also contributes to the EU policy of sustainable mobility by enhancing the attractiveness and accessibility of more sustainable transport modes such as public transport and by enhancing efficiency and quality of the public services by the improvement of the overall cost-effectiveness of transport operations and of the related telematics infrastructures.

CONTRIBUTION TO COMMUNITY SOCIAL OBJECTIVES (QUALITY OF LIFE AND SUSTAINABLE DEVELOPMENT)

The massive increase of demand for travel has led towards increasing congestion; this trend will be continuing with no chance of the supply of road space necessary to meet this demand; new innovative solutions have to be found to maintain the objective of sustainable mobility while reducing energy consumption and air pollution in European conurbations for instance trying to adapt the traffic space to the expected demand with the help of telematics technologies.

PRISCILLA addresses the aims of the EU social objectives in terms of improving quality of life, protection of the environment (saving energy), industrial competitiveness, employment opportunities and cost-effectiveness of public money.

The adopted bus priority strategies on large urban areas can significantly reduce PT travel time and, due to the fact that it has been demonstrated that modal shift in favour of Public Transport is substantially influenced by travel time, deploying proper strategies on large networks could encourage modal shift in favour of Public Transport.

Industrial competitiveness is enforced by the adoption of best practice bus priority strategies both for system integrators and for single product / technologies suppliers, meaning also a growth in employment prospective in the field of the Intelligent Transport Systems (ITS). Another important issue about employment is the deployment of new skills and the consequent new role that the operators at the different control centre acquired with the

procedure needed to manage bus priority strategies on large areas. The real time dialog between the Urban Traffic Control operators and the Bus Control Centre operators is consequently becoming the "core" of all the mobility management. They decide the routes to be prioritised, the level of priority to be given to different directions; the configuration of the several parameters needed to manage bus priority systems within the traffic signals algorithm and the communication systems.

Cost-effectiveness of public money is an issue clearly addressed by bus priority on large areas; even if in different contexts in Europe (regulated market, regulated competition, free market) Public Transport is partly funded by public funds. Increasing punctuality means providing an improved service level with the same system cost.

ECONOMIC DEVELOPMENT AND S&T PROSPECTS

From the scientific and technological point of view PRISCILLA builds upon previous work undertaken in the Telematics Applications Programme (Fourth Framework Programme); bus priority technologies were already available but numerous barriers existed in developing and supporting a wide network implementation.

The Dissemination and Exploitation activities show a wider impact on the community (especially in CEEC) and encourage the wider diffusion of the applications developed during the project. The benefits obtained are amplified through additional shared experience resulting from active participation by the partners in EU networks such as POLIS.

In its activities and documents, notably the "best practice guide", PRISCILLA contains the potential for internal and external replication, redeployment and reuse of results. All the results have been used in the best practice guide for implementing decisions about bus priority systems on wide areas that can be regularly used after the end of the project.

By participating directly in the proposal the industrial partners show their faith in the successful exploitation of the products being developed and increase the co-operation of big European industries in strategic telematics applications.

PRISCILLA has several exploitation impacts in terms of improvement of competitiveness and creation of market opportunities for the participants; due to the fact that only a few cities in Europe have now big PT networks with bus priority systems industrial competitiveness will definitely be enforced by the development of bus priority strategies on wide networks. There

is a big market for bus priority systems and for their integration with other mobility management systems (in particular with the Urban Traffic Control systems); another share of the market is about cities without these kinds of technologies but rapidly evolving towards the use of the Intelligent Transport systems (e.g. the Romanian PT companies directly involved in the consortium); a significant opportunity exists to achieve great economies of scale. Opportunities to exploit these systems involve not only the big system integrators like the PRISCILLA's partners but also the related suppliers of single products like GPS for positioning systems, microwave short range communicators, telecommunication providers, geographical information systems producers, trafficlights regulators suppliers.

5) DELIVERABLES

	Deliverable name	WP	Editor	Content	Story
D1	Presentation of the project	1	AMT	Project main goals, key issues, technical approach, expected achievements and results.	Submitted in month 3.
D2	PT priority state of the art review	2	SCC	Worldwide state-of-the-art-review of bus priority, with particular reference to systems, strategies, performance and factors affecting success of bus priority at traffic signals. A state-of the-art review of simulation modelling applied to bus priority is also provided.	Submitted in month 5 and revised beginning 2002 in order to take into account the comments from the annual review 2001.
D3	Evaluation plan	5	ZELT	Categories, criteria and means of the evaluation tasks. 3 different categories of Evaluation are considered: Impact Evaluation (bus travel time, punctuality, private car travel times), User Acceptance (professional users) and cost benefit Analysis.	Submitted in month 9 and revised beginning 2002 in order to take into account the comments from the annual review 2001.

	Deliverable name	WP	Editor	Content	Story
D4	Evaluation results	5	ZELT	Detailed results of the field trials in Genoa and in Toulouse and of the simulation in Southampton statistically treated. Outcome from the user acceptance workshops and results from the socio economic analysis.	Submitted in month 21 and revised at the end of the project following the comments coming out from the 2002 final review.
D5	Best practice guide for PT priority in Europe	6	SCC	Arranged into sections that cover the different stages of the bus priority system life cycle: feasibility, pre-evaluation, design, implementation, evaluation, maintenance and system expansion. Information and guidance is also given about the various systems, methods and strategies that can be employed to achieve success.	Submitted in month 22 and revised at the end of the project following the comments coming out from the 2002 final review.
D6	Final report	1	AMT	Project overview, objectives, approach, results, deliverables, dissemination activities, project management, outlook.	Draft submitted in month 22. Final version at the completion of the project.

	Deliverable name	WP	Editor	Content	Story
D7	Technological Implementation Plan	6	SCC	Covers the intentions of all partners related to the potential knowledge generated under the project. It contains a transferability study with a theoretical approach and a practical exercise for potential transferability of the bus priority systems and simulation software developed in the project.	First draft submitted spring 2002, final release submitted in month 22.

All the deliverables have been considered publicly available by the consortium.

6) DISSEMINATION ACTIVITIES

This Work Package was successful in its aim to achieve three objectives:

- to raise awareness and understanding of the PRISCILLA Project within both the Traffic Management Sector and the Public Transport Sector;
- to raise understanding of the problems of the wide scale introduction of public transport priority in the wider community;
- to produce a Best Practice Guide giving guidelines describing how a bus priority should be introduced in an large urban area.

The key dissemination methods were a number of CEEC dedicated events, a number of newsletters (translated in different languages), a number of on-site visits (Zurich, Cardiff, Modena and partners sites), an updated web site, publication of papers in refereed scientific journals, contributions to technical seminars and conferences, dissemination of Best Practice Guidebook.

CEEC dedicated events

The Project had the responsibility of disseminating the results of the Project and raise awareness of bus priority in CEEC Member countries by the organisation of two User Workshops. Whilst the identified goal as stated in the Contract, was that the workshops should have been organised in parallel with other European events, despite considerable effort and the assistance of POLIS, UITP and EuroCities it was impossible to identify suitable events. Therefore the decision was taken to organise specific events for PRISCILLA.

Two such events were held in June 2002. The first in Prague (4th June) attracted approx 50 delegates mainly from Czech Republic, but there were attendees from Slovakia and Romania. The second in Budapest (27th June) attracted approx 70 delegates from Hungary. In addition it should be mentioned that the consortium attended two workshops (12th Oct 2001 and 12th Jul 2002) organised by URTP in parallel with project meetings to disseminate the project results in Romania.

In addition there had been significant local dissemination at local level by each of the Site Co-ordinators.

Project Information and Promotional Material

The promotional mediums that were used will be for conveying the project information to interested parties were newsletters and key results brochure.

Two newsletters were produced during the project; the first explained the Project goals and the second coincided with the publication of D2 the State of the Art Review. Both newsletters were distributed widely by E-mail with the assistance of European Network Organisations POLIS and UITP.

A key results brochure was produced near the end of the project which coincided with the release of D5 the Best Practice Guide. This brochure doubled as the final PRISCILLA newsletter. Again this was distributed using the assistance of POLIS and UITP.

A local final brochure has been produced in Toulouse (French / English) and circulated during the final conference.

Site Co-ordinators in the project member countries produced both the newsletters and the final brochures in English, French, Italian and Romanian for distribution.

The newsletters were also translated into Czech and Hungarian in association with the CEEC workshops.

PRISCILLA Web Site

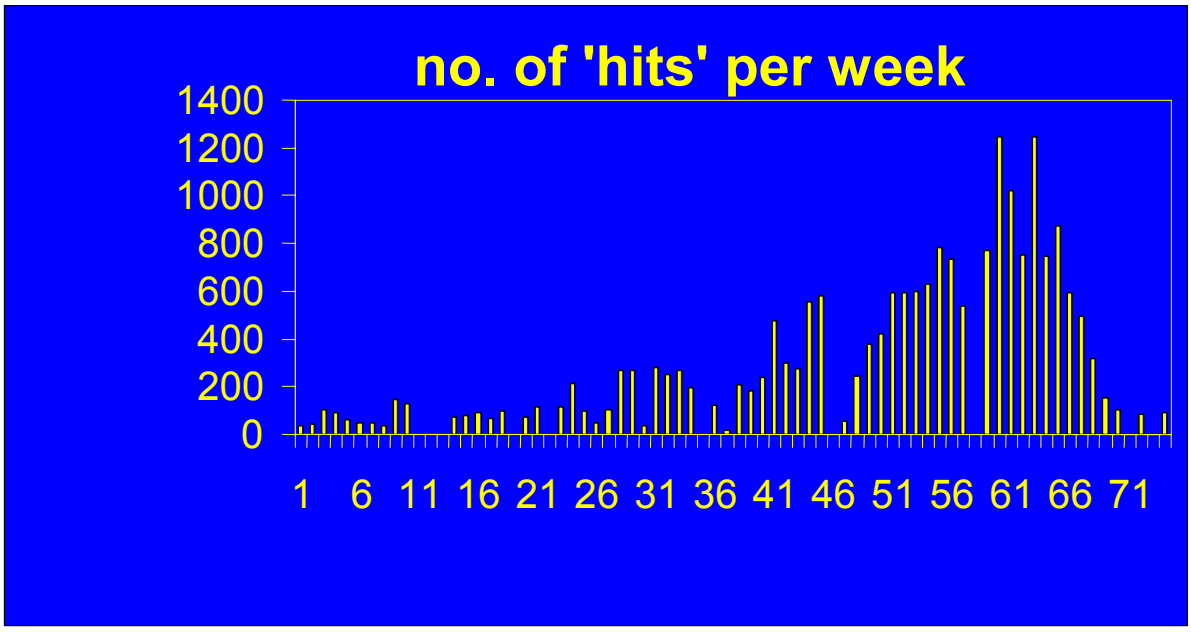
A key tool in the dissemination process was the dedicated PRISCILLA web site that was maintained by TRG that contains the following sections.

- The Project - This provides newsletters and brochures (in English, Italian, Romanian and Hungarian) describing the project, giving an overview of the project objectives, work plan and of progress made.
- Consortium - Giving contact details for the PRISCILLA project partners.
- Deliverables - Those project deliverables of type 'public' are posted on the web site for free download.
- Sites - Providing background information for the PRISCILLA cities.

- Events - Reporting the PRISCILLA dissemination activities (workshops in Prague, Budapest and Bucharest) and providing Powerpoint presentations and photographs from these events.
- Related web sites - This provides additional information to the visitor on related web sites.

The web site was on-line from early 2001.

Analysis of the web 'hits' shows that they increased during the life of the project, with significant increase immediately after workshop activities.



Contributions to scientific journals

Submission to scientific journals was not as great as originally thought. This was due to the short timescale of the Project and the required time to get journaled papers accepted. It was only possible to get one such paper accepted to TRB conference and that was presented in January 2002. That paper was peer reviewed for publication in the Transportation Research Record series.

Contributions to seminars, and conferences

As well as the conference mentioned above it was envisaged to present papers to annual ITS World Congress and the bi-annual IEE Congress in London. However again due to the short

project timescale and the lead in time for draft papers, the timescale prevented a submission to either.

However the PRISCILLA project was mentioned on many occasions when project partners gave presentations on wider ITS issues.

There has been considerable assistance from POLIS is disseminating the project both within their monthly newsletter and with presentations at both the Prague and Rome annual conferences (2000 and 2001).

Two members from the project have taken part in VOYAGER Project activities.

The final results of the project will be presented in London by the project coordinator in December 2002 during the conference "Transport solution Europe 2002".

Final Conference

The final conference of the project has been organised in Toulouse at the "Cité de l'Espace" the 12^{ve} of September 2002. The conference's goal was to introduce the results obtained in the framework of the PRISCILLA Project, to share experience acquired in the field by all the various players and discuss perspectives in terms of development and deployment of priority for public transport. The Cité de l'Espace Museum was chosen to host the event; it is laden with symbolism as it conjures up both innovation as related to European projects (Ariane V), co-operation with the East European countries (MIR space station) and using satellites for vehicle positioning and guidance.

Around 50 persons attended the conference mainly coming from France. After a welcome speech from Christine De Veyrac (deputy mayor for international affairs), the various project partners presented the main achievements of the project (general introduction, state of the art, simulation, evaluation results, best practice guide, Romanian contribution). In the afternoon other bus priority experiences have been presented both in terms of technologies and strategies (Zurich, Toulouse in details, Val d'Oise, Bucharest). Some closing speeches including Jean-Michel Lattes (deputy mayor for transport) and Wolfgang Hoefs (Project Officer in charge for the conference) ended the conference.

Best Practice Guidebook

This was the main end product of the project and gives guidelines on best practice on the implementation of bus priority in a large urban area.

An shorter version of the document is also translated into 4 CEEC languages (Czech, Hungarian and Russian and Polish) and disseminated via the umbrella public transport organisation in each of those countries.

The target audience in all cases included ITS managers, traffic management managers, public transport managers within public transport operators, national governments and local authorities.

Special dissemination in Romania

The main task has been to transfer the information produced all along the project's deployment to the attention of URTP members, as well as all the decision makers in this field of public transport services. The results should be measured by future projects in Romania, going on with research & development activities for implementing ITS technologies in such public transport priority strategies in traffic.

The most important tools used by URTP on this purpose, have been the following:

- a monthly Informative Bulletin informing about the stage of the project, following the quarterly meetings (more than 10 pages, A4 format, each issued in 100 copies)
- a quarterly magazine TRANSURB that described, in a more detailed manner, the deployment of the project, based on the information offered by the content of the finalised deliverables (more than 50 pages, A4 format, each issued in 120 to 200 copies).
- two brochures issued on the occasion of the two workshops organised in Romania, summarising the information disseminated in between – 17 pages, A4 format, issued in 150 (Brochure No. 1) and 75 copies (Brochure No.2),
- articles in other publications, like OAMENI & COMPANII, a monthly national magazine, earmarking in a few pages the two workshops held in Romania,

addressing both to all the Romanian local authorities and governmental institutions - issued in 500 copies,

- translation and circulation of the two Newsletters of the project (March and August 2001) – 4 pages, full colour issued, in more than 100 copies each,

- 2 workshops organised in Romania, when the Local Consortium members presented the stage of developing this project. The first one took place right after the start of the measurements stage (12 October 2001) and the second right after evaluating the registered results (12 July 2002). The first workshop has been a first contact for a presentation of both what are the top technologies in Europe and world wide on this subject and the three sites' experience shared by the representatives of the Local Consortium of the project. 35 persons attended this event of which 25 representatives from 20 public transport operators of different cities, 6 city councils representatives, 1 research institute and 3 specialised companies. The second workshop offered the opportunity to present both what were the results evaluation, including impacts of the most important indicators taken into account and some very first achievements on the long way of implementing such priority systems in Romania. There were 4 Romanian cities (Arad, Bucharest, Ploiesti and Timisoara) showing their projects in course for developing, as a start, the main components of such systems like the Automatic Vehicle Location and Urban Traffic Control centres . 30 persons were able to attend this event, of which 11 public transport operators, 2 City Councils and 17 specialised companies. Each of the two workshops has been followed by a press conference whose impact was measured by some articles published in some important Romanian newspapers, a brief presentation on two national TV posts (ANTENA 1 and B1TV) and interviews on Radio Romania News.

- Conferences and other events organised by other institutions than URTP, the attendants being different Romanian institutions concerned with research & development activities for public transport service or with an international participation: URBEXPO Conference and exhibition (5/7 September 2000) held in Bucharest, EXPO CARGO, the first international fair for Transport and Logistics organised in Bucharest, Romania (26/29 April 2001), organised by UNTRR, the First National Conference of Research, organised by the Romanian Ministry of Education and Research on 08 April 2002 in Bucharest.

- Web presence within URTP web site www.urtp.ro. While the Romanian version contains the most representative articles of our publications, the English version is linked to the project web site www.trg.soton.ac.uk/priscilla.

- On the occasion of "The urban Public Transport Day in Romania" celebrated on 8 June 2001, the logo of the project has been included, together with its unfolded title, within large promotional posters (40x60cm) full colour printed. This poster has been distributed in 3000 copies to all our public transport operators who displayed them on their vehicles for a whole week (4 to 10 June 2001).

- The Best Practice Guidebook, translated and published in Romanian to the end of this project, is the final and the most important tool used by URTP in order to draw the attention of all those concerned with public transport services in Romania.

There is no doubt that the project PRISCILLA was an important source of information, inspiration and knowledge for these first attempts, as they are registered in Romania, but also a further support for next steps in endeavouring to promote top IT technologies, as described in this project, in further investments.

7) PROJECT MANAGEMENT

Responsibilities have been well defined through the following management structure.

PRISCILLA Project coordinator carried on the general co-ordination. Its function was providing direction, particularly in terms of promoting the project towards the European Commission, in reporting progress and in providing guidance on all issues of overall technological importance. The project coordinator co-ordinated the production of the deliverables and any other business related to the contract requirements (cost statements, annual progress report,…). The PRISCILLA coordinator supported all the administrative and financial management of the project, providing the single contact point for the Commission, being responsible for all day to day management issues particularly in the area of administration (progress reporting, cost statements) and finances (distribution of funds, bookkeeping) and organising the project internal information and communication flow on all issues of relevance.

The different members were also the Workpackage Leaders (WPL) co-ordinating all common aspects in their respective area and being responsible for reporting progress of their Workpackage to PMG; the WPLs were also responsible for the production of the deliverable falling into their WPs. Deliverables have been put together by WPLs and circulated to the consortium for approval and, after the approval, submitted via the project coordinator to the Commission. In particular the *Dissemination Manager* comes from the Authorities side (Southampton City Council) in order to guarantee the necessary vision especially to achieve a great distribution of results at local level and the *Evaluation Manager* comes from a laboratory centre (ZELT) specialised in the assessment of the impacts of the telematics applications.

The Local Project Managers of the partner cities guaranteed the technical and managerial co-ordination in the cities and reported to the project coordinator; in particular they were responsible for the local underlying business case.

Nine meetings have been held on a try monthly base. The first and the last meeting have been held in Toulouse. Two meetings have been held Romania in conjunction with the 2 project workshops (Sinaia and Bucharest). Two meetings have been held in UK (Southampton and Cardiff). Two meetings have been held in Italy (Genoa and Modena). One

meeting has been organised in Zurich. In each meeting a special technical visit has been organised in order to visit the PT priority systems and the related UTC where available.

Management reports have been structured as follows.

Old name	New name	Period covered	Notes
Quarterly Management Report#1	1st Quarterly Progress Report	3 months 1/11/00 31/1/01	
Progress Report#1	1st Periodic Report (containing 2nd Quarterly Progress Report)	6 months 1/11/00 30/4/01	Together with CS#1
Quarterly Management Report#2	3rd Quarterly Progress Report	3 months 1/5/01 31/7/01	
Progress Report#2	4th Quarterly Progress Report	3 months 1/8/01 31/10/01	Due to a misunderstanding it contains info about the last 6 months
	5th Quarterly Progress Report	3 months 1/11/01 31/1/02	
-----	2nd Periodic Report	12 months 1/5/01 30/4/02	Together with CS#2
-----	*6th Quarterly Progress Report*	*3 months 1/5/02 31/7/02*	*Abolished with the consensus of the Project Officer*
-----	3rd Periodic Report	5 months 1/5/02 30/9/02	Together with CS#3

Main *deviations form plans* are presented in the following table:

Causes and Description	Corrective actions
Due to the late start of the project the measurement phase was originally foreseen from July 2001.	As all the measures concerning traffic, summer is not really relevant in order to have good results (less traffic, not real situation) the Project Officer agreed to start the measurements in September 2001 concentrating the different phases in order to finish in month 16 as foreseen.
Genoa: delays in starting the measurement phase due to: G8 (some installations destroyed + delay due to G8 impact on all the activities of the city), Fibre Optics installation all over the city, UTC new location, Adaptation of traffic signals to new Italian Road Law, New Urban Traffic Plan, Technical problems in AVM development.	Modification of the measurement phase The 6 groups of lines are merged in 3 clusters. Each cluster will have two sets of measurement periods. Each period is of 4 weeks (first with BP following maximum speed, second with BP following regularity, third without BP, fourth to collect and analyse data). Measures will start week 45/2001 (5th November) and finish week 12/2002 (29th March) excluding Christmas period.
Toulouse: 21st September AZF disaster The biggest bus warehouse of SEMVAT and the administrative office are destroyed.	Modification of the measurement phase: - Suppression of 1 bus lane (due to the physical damages) in the study panel; - Modification of the WP 4 planning: o 1st measurement phase : week 42 to 46 o intermediary analysis phase : week 47 to 1 o 2nd measurement phase : week 2 to 5

Concerning *contractual issues*:

- Two Membership Agreements has been signed and delivered to the Project Officer at the end of 2000. The third one (concerning French members) has been fully signed in February 2001; a letter explaining the commitment of the members to sign and the reason of the delay has been sent from the French principal contractor Maire de Toulouse to the Project Officer at the end of the 2000.

- The Project Officer agreed with the ZELT request to shift 1 man-month from the WP 6 (Dissemination) to the WP 5 (Evaluation). The main reason was to increase the resources affected to the evaluation and to analyse a biggest panel of data. Total amount of resources remained the same.

- A 3 months extension has been officially required in November 01 and accepted in 2002.

- Alexandre BLAQUIERE, who was the Toulouse local project coordinator, has moved from the City Council to the SMTC in the early of December 2001. As the SMTC is also taking part in the PRISCILLA project, he continued to follow the project and ensure the local coordination within a local convention between the Toulouse City Council and the SMTC.

- SMTC asked to shift the resources not spent on the WP 3 (System Configuration) and a part (70 hours) of the resources allocated to the WP 6 (Dissemination) to the WP 5 (Evaluation). That permitted to assist ZELT on the system analysis and on the evaluation results presentation.

- During the life time cycle of the project new persons have been working on it. Details are in the different management reports.

Concerning the *annual review* held in Brussels in October 2001 the project taken all the actions needed to take into account the reviewers remarks and comments; mainly a new revised version of D2, a new revised and peer reviewed version of D3 and the anticipation of a draft D7. Also concerning the *final review* held in Toulouse in September 2002 (the day after the final conference) the project taken all the actions needed to take into account the reviewers remarks and comments; mainly a new revised version of D4 and D5 and the completion of this final report.

8) OUTLOOK

The benefits gained from the project and future exploitation plans are detailed in the following table.

Partner	Benefits gained from results	Exploitation intentions
AMT	Improve knowledge on bus priority development all over the life cycle of the project. Deep understanding in results that can be obtained using different strategies. Development of powerful junction behaviour evaluating tools that can be reused in the day-by-day management of the systems. Improve cooperation between bus control centre and UTC that has lead to an overall improvement in the traffic management.	Use the results obtained in the field trials and the recommendations given in the Best Practice Guide to enlarge the systems from the actual number of junctions in order to cover all the main routes of the city from the peripheral area to the city centre.
ELSAG	Development of powerful junction behaviour evaluating tools. Knowledge gained in handling, managing and analysing junction and bus log data, junction behaviour analysis and bus control regulation strategies analysis.	Improve our Priority System performances where they are already installed (in many italian cities) where the communications are of the same kind as in this Project, with the evaluation results. Give a further feature to Customers (evaluating tools) Help Customers in selecting junctions to be equipped (for new Systems or improvements to existing ones)
URTP	The information received following the dissemination activities of Priscilla project is a considerable support in starting the first steps for an efficient implementation of bus priority system in Romania The experience shared during the deployment of Priscilla is a very useful tool for encouraging Romanian public transport operators to take into account the approach of the project partners in this project when tackling strategies for public transport priority systems in traffic within partnerships with local authorities.	Concerning the current priority systems of public transport in traffic, promoted within some Romanian networks and known as segregated systems, local authorities and public transport operators should expand them within both a local strategy of developing public services and use land planning for the coming years. As for the first technical projects registered in a few large Romanian cities on this subject, after finalising the corresponding investments, they should follow the experience learnt from PRISCILLA project.
SCC	The Best Practice Guide is a high level guide covering the different stages of the bus priority system life cycle. As such it provides a comprehensive framework within one document on how to expand bus priority at traffic signals. PRISCILLA has shown that the deployment of bus priority at traffic signals from a small scale to a network wide scale does not present major technical difficulties.	To use the successful strategies developed from field trials and simulation studies as the basis for any bus priority plans implemented as Southampton expands its bus priority network. To expand the simulation model of Southampton to encompass different regions and areas to assess and evaluate the provision of bus priority. To continually collect relevant data in order to successfully evaluate, manage and maintain network wide bus priority.

HCC	Increased knowledge of implementing area wide bus priority measures. Understanding of benefits accrued from introducing different priority strategies.	Consideration for introducing area wide bus priority within existing UTC system.
TRG	Development of a modelled simulation network (SPLIT) of Southampton City bus services. Gained an understanding of the relative merits of using different bus priority strategies. Knowledge gained of other cities bus priority systems, particularly of our project partners in Toulouse, Genoa and in Romania. Gained an opportunity to disseminate our findings to and hold discussions with Central and East European countries (Hungary, Romania and Czech Republic) Gained experience of developing the project website.	The SPLIT simulation model will be used to provide support to Southampton City Council in their development of wide-area bus priority in Southampton. This is likely to involve expansion of the currently modelled network to consider more bus routes. It is anticipated that further simulation research and development work will be undertaken to consider other aspects of bus priority and bus operations. One area of development identified is consideration of 'all-day' operations, where multiple bus trips throughout the working day are modelled.
STCL	The results from the PRISCILLA Project will help to underpin the benefits of bus priority measures which will in turn promote the deployment of new technology.	The PRISCILLA test results and transferability analysis will be used to promote the benefits of network wide bus priority measures to customers. This together with the cost benefit evaluation will be used to help Local Authorities and other public funded organisations present a convincing case for securing funding. Where the transferability analysis shows an appropriate correlation the most effective strategies evaluated in PRISCILLA will be offered to appropriate sections of the customer base.
MDT	Experience in term of overall traffic management	Dissemination in the AITF technical group. Further development of Capitoul algorithms.
SMTC	Experience in term of configuration of the system and of optimisation of its impact for the public transport regulation and the overall traffic management.	Strategy of deployment of the system on the bus network taking into account the main learning of the experimentation. Dissemination at the national level.
SEMVAT	Experience in term of configuration of the board equipment and in term of high sensibility for location of the bus stops.	Further development of software tools and differential priority strategies.
ZELT	Improvement of the field trials methodology and methods for the treatment of the data.	Dissemination of this knowledge in the technical network of the French Ministry of Transports.

9) CONCLUSIONS

PRISCILLA is a Take-up Action running from November 2000 to September 2002 with an EU funding of 500.892 EURO aimed to facilitate the adoption of experiences and solutions for bus priority systems applied to wide area networks.

PRISCILLA's main steps are as follows:

- analysis of the State of Practice
- implementation and demonstration of wide area bus priority via field trails in Genova and Toulouse and simulation investigations in Southampton
- evaluation and assessment of user acceptance, impact and cost/benefits
- preparation and dissemination of a Best Practice Guide for bus priority action

The work has been completed satisfactorily in accordance with the technical annex, after that some of the deliverables have been revised to improve the quality.

While the PRISCILLA project has considered many aspects of providing bus priority at traffic signals, there is still considerable scope for further research. The following research tasks have been identified as being particularly relevant and interesting.

- Development and evaluation of headway based strategies in order to improve regularity instead of punctuality, especially for frequency-regulated bus services.
- Application and evaluation of different strategies under different and more varied traffic and bus network conditions.
- Analytical pre-evaluation analysis of the feasibility and the effectiveness of bus priority on a single junction.
- Analysis of bus priority performance in relation to different traffic signal plans, bus priority parameters, bus detection system, numbers (frequency) of buses on routes.
- Development and evaluation of a wireless, non-centralised system for traffic signal management in peripheral areas and integration with the actual centralised system.
- Development of tools for automatic calculation of indicators about the system performances.

- Improvement of the communication means between the bus and the AVL system.
- Improvement and wider application of the simulation modelling of bus priority systems.
- Development of an "intelligent" AVL able to apply bus priority strategies in a flexible and adaptive way according to traffic and bus network conditions and operational goals.
- Development of new bus fleet regulation algorithms taking into accounts the whole bus network.
- Improvement of methods for dealing with bus priority conflicts.
- Improvement of the evaluation criteria and indicators in relation to a global transport policy assessment.
- Use of new technological means for bus location and telecommunications.