

DEMONSTRATION SITE:	ATHENS/GREECE 
NAME OF THE DEMONSTRATION PROJECT (CASE STUDY):	ENVIRONMENTAL TRAFFIC MANAGEMENT, BUS PRIORITY, MULTIMODAL TRAFFIC INFORMATION
DURATION OF THE PROJECT:	JANUARY 1996 – DECEMBER 1997
NAME OF THE TAP PROJECT:	QUARTET PLUS VALIDATION OF A EUROPEAN URBAN AND REGIONAL IRTE BASED ON OPEN SYSTEM ARCHITECTURES

URBAN PROFILE

Athens is situated in the Central Eastern part of Greece. The Metropolitan area of Athens has a population of 3.098.775 inhabitants and a surface area of 427 sq. km. The municipality of Athens covers an area of about 37.732 ha and has a population of 748.110 inhabitants. In Athens there are three main means of public transport: metro, bus and trolley bus with a minor suburban rail network.

The effects of the rapid population growth and sub urbanisation brought the transport situation, especially with regard to pollutant emissions, to a point where new radical solutions were needed. The overall transport strategy for the city is inevitably focussed on reducing air pollution levels by limiting the number of motor vehicles, particularly in the central areas of the city and by promoting other means of transport.

When pollution reaches high levels, all cars are banned from the central area for a few hours. All cars are required to meet the pollution standards system with standards that will be strengthened in the near future.

ABSTRACT

The project QUARTET PLUS was developed to demonstrate the potential benefits of an integrated approach to solving urban transport problems. All the demonstration sites of QUARTET PLUS were convinced that integrated transport telematics application can increase the proportion of travellers using public transport, improve efficiency of both private and public transport, reduce the likelihood of environmental pollution and improve the quality and quantity of information available to the traveller.

The QUARTET PLUS project was conceived to follow and complete the work started in 1992 by the QUARTET project within the European Transport Telematics Programme (DRIVE II).

At each site (Athens, Gothenburg, West Midlands, Stuttgart, Toulouse, Turin) an Integrated Road Transport Environment (IRTE), consisting of a variety of services co-ordinated by a

common control strategy, was built and assessed. Within the QUARTET PLUS project, the “added value” gained through integration of systems (including: Urban Traffic Signal Control, Traffic Management, Public Transport, Multimedia Information System, Pre-Trip-Planning and Pollution Monitoring) were assessed.

Within the QUARTET PLUS project, the city of Athens wanted to realise the concept of the “Mobility regulator”. The key objectives of the “Mobility Regulator” are:

- To contribute to an equilibrium between the user’s demand for mobility and the level of services of the transportation system.
- To suppress or redirect the use of private vehicles through traffic information (pre-trip and on-trip) and control (gating) techniques;
- To promote the quality of Public Transport Services (Bus priority)
- To widely disseminate Traffic Information using emerging electronic dissemination techniques (Internet)

The assessment of the trials that have been implemented within the “Mobility regulator” concept in Athens has shown that considerable improvements of the traffic flow are possible. Bus priority with gating of car traffic in Athens showed less stops for buses with priority. Public Transport travel times could be reduced by 15% without any significant effects for car traffic.

BACKGROUND AND OBJECTIVES

In the city of Athens, there was a clear need for the introduction of co-operative monitoring and control of urban traffic, since responsibilities for political action to manage the problems caused by increasing levels of traffic were split up: The municipality of Athens is very sensitive to all environment related problems of urban traffic, i.e. congestion, pollution, deterioration of the level of city services. However, the Ministry of Environment, Planning and Public Works is the only competent authority for the operation and maintenance of the city’s Urban Traffic Control system.

The QUARTET PLUS pilot application in Athens is attempting to combine the responsibilities and assets of the municipality of Athens and the Ministry of Environment, Planning and Public Works in a constructive, integrated way in order to prove and assess the concept of the “Mobility Regulator” in an urban environment.

The main objectives of this concept are:

- to combine the responsibilities and assets of principal organisations in the city in an Integrated Road Transport Environment (IRTE) in order to assess the concept of the “Mobility Regulator”
- to suppress private vehicle traffic through traffic information (pre-trip and on-trip) and control (gating) techniques
- to optimise public transport operation (bus pre-emption)
- to create and provide a wide range of traffic information services and support methods for updating knowledge of relevant traffic information
- to ensure maximum system availability during degraded operation.
- to evaluate the impacts of the implementation, the appropriateness of the choices made and the transferability of the implemented architecture to other cities
- to contribute to the open market of Telematics Applications.

PRESENT STAGE OF IMPLEMENTATION

The demonstration in Athens is based on existing infrastructure and methods that were enriched with new installations and modifications. Gating and Bus priority strategies have been demonstrated at two demonstration sites in Athens. These two demonstration sites have been carefully chosen so that they adequately represent the traffic conditions.

The first site is located in the north of Athens (Kifissias Avenue) and accommodates most traffic generated in the northern suburbs. There are three lanes in each direction; one of them is a dedicated bus lane leading to the centre of the city. The avenue is regarded as a free avenue and there are four major junctions where left turns are permitted.

The second site, Iliopoleus Avenue, located in the south-eastern part of the city, is the main axis leading from the south suburbs to the city centre. It is a one-way road with up to three lanes and junctions at approximately 500 m intervals. On this second site there is no dedicated bus lane.

Although at present, the system is only being applied on two axes, the municipality of Athens has the intention to establish complete gating for the whole city by applying the system to all the axes leading to the centre of the city.

Moreover, the QUARTET PLUS/APOLLON pilot application takes advantage of the internet to present traffic information to the general public. The real-time travel information, combined with public transport information and real-time traffic maps, represent the core mechanism of all integrated strategies in order to establish the environmentally balanced use of public or private transport. This application is now in full operation and it is updating every 15 minutes.

Another important means for providing traffic and environment related information to the public are Variable Message Signs, which have been introduced by the QUARTET PLUS project and are now under exploitation with big chances of improvement and evolution.

The Internet and VMS information systems are being permanently evaluated by two questionnaires attached to the real-time on-line traffic map of Athens on the Internet. Users and visitors are asked to fill in the questionnaires.

With regard to the Environmental Traffic Management, as part of further QUARTET and QUARTET PLUS field trials, a real-time demonstration of the full-scale implementation was carried out. This was done in three sessions involving the Ministry of the Environment, the Police, the Athens public Transport Company and the UTC. If the bidding process with the Ministry proceeds with no further delay, full installation of the system will be completed by December 1999.

Financing and Resources used

Overall budget: 10 million ECU

EC contribution: 3.5 million ECU

TECHNICAL PROFILE OF PROJECT

Gating and bus priority strategies

Within the QUARTET PLUS/ APOLLON project it was the first time that the two techniques of gating and bus priority were implemented simultaneously in the city.

On Kifissias Avenue, priority was mainly given to the bus. Other modes were also favoured, when there was no need to contain traffic. Here detection beacons were positioned on accesses to bus lanes, and according to the situation, a decision on extending the duration of the traffic

light was made. For the application of the gating system, beacons were positioned on the other lanes and the traffic conditions were monitored. After the elaboration of the data, the gating system was applied when necessary.

On Iliopoleos Avenue, priority to Public Transport was given only when buses were detected amongst the other modes. On selected nodes and for the bus priority strategy, special beacons were positioned for bus detection, approximately 30 meters before the Stop line and were connected to the traffic regulator. In the case of gating detection, appropriate beacons were positioned at the beginning of the following road link. Software concerning gating activation had on-line input of recorded on-site traffic data.

Internet Information Services

QUARTET PLUS demonstrated a dedicated WWW project site including applications, such as:

- Communicating QUARTET PLUS transportation objectives and progress to the general public,
- Providing real-time travel and traffic information to city commuters;
- Providing basic public transport information to city commuters;
- Fostering a peer-to-peer dialog through web-based query forms.

The CSSC with its global view (through UTC) of the traffic situation assigns traffic volumes to predefined levels of services, and/or access times for selected destinations and forwards them to the QUARTET PLUS WWW server for distribution in a multimedia-like format.

The methods and tools used for the development of the QUARTET PLUS WWW site have utilised the best technology such as the Java programming language. The Java development tool has offered the potential of real-time animation and user event handling in a dynamic way. Specialised platform independent software (applets) running in the user's computer enables them to have numerous user-friendly views of the city centre traffic situation in real-time mode.

The Department of Transportation Planning and Engineering of the National Technical University of Athens (NTUA) has developed the on-line map of Athens. It offers a lot of services such as traffic volume map, congestion map, a travel time map and a link to the VMS real-time web site.

Variable Message Signs (VMS)

The VMS used in Athens are the so called standard VMS that inform the drivers on traffic conditions, roadworks, the overall road condition, weather, pollution, special messages etc. In Athens, 6 Routing VMS panels, located on main axes entering the city centre, have been installed.

The devices are LED displays with 4 rows x 15 characters. The messages are: traffic data, incidents, pollution etc. and are descriptive, prescriptive and preventive. The devices are connected via serial interfaces to the LAEC control centre.

RESULTS AND IMPACTS

The validated impacts in the course of the project could be summarised as follows:

- Considerable impact on the Transport System in terms of improved public transport services, reduced fuel consumption, better control of pollution levels and cost savings;
- Positive effects on travel conditions: reduced travel times, better information for travellers, and more comfortable and convenient travel.

The methods for collecting data consisted of manual or automatic registrations, on-line counters or ad-hoc measurements and user surveys (personal interviews and/or questionnaires). For the assessment of the IRTE strategies, evaluation of traffic conditions before and after implementation (both downstream of the selected nodes and along the network) and evaluation of the level of service of public transport was performed.

In Athens, the bus travel survey showed a reduction ranging from 12% to 15% on Kifissias Avenue and from 13% to 19% on Iliopoleos Avenue, depending on the period of the day. Travel speeds increased from a minimum of 2.3 km/h in the afternoon peak period to a maximum of 7.3 km/h in the morning.

There was a significant increase in the number of buses that passed with an immediate green traffic light (11%-78%) and a reduction in the time the buses were stopped (6%-21%) was detected.

Assessment of the private traffic flows that were affected by gating strategies gave the following results: occupancy rates upstream rose, while occupancy rates downstream gradually fell. Traffic volumes fell upstream and downstream, as the objective of the gating strategies is to restrict traffic going towards the centre of the city.

Concerning Internet Services, an analysis showed that 56% of the respondents were one-off visitors to the site, while 46% were regular users. High rates were obtained for the comprehension (72%), usefulness (78%), accuracy (65%) and access time of the service (65%).

The survey of the User Acceptance of the VMS showed that people in general appreciated the information given on traffic conditions and they were very much concerned by the information related to atmospheric pollution.

BARRIERS AND CONFLICTS

The Cost/Benefit analysis showed that the service likely to generate most revenues would be the public terminals. However, Athens together with Stuttgart and Turin all decided not to proceed with such systems because of the relatively large direct costs of providing such a service to a large enough number of locations.

Most conflicts were met in the case of VMS, related to perception, comprehension and compliance. Although it appeared that VMS were displaying suitable messages, there seems to be a need for more consistent and understandable information. In other words, the availability and functionality of the system needs to be increased.

TRANSFERABILITY

QUARTET PLUS has validated technical approaches and systems that can be applied throughout Europe.

Regarding the transferability within Greece, detailed analysis of the transferability of IRTE architecture and tools examined the possibilities of gradually implementing or expanding the system in city of Thessaloniki. This pilot project is expected to assess conditions, possibilities and prospects for traffic regulations and management as well as examine feasibility parameters. The

main objective is the recommendation of a proper action plan for the future resulting in the evaluation of all traffic planning-related conditions and parameters within the central (commercial) area of Thessaloniki.

LESSONS LEARNED

The experience of QUARTET PLUS leads to the conclusion that building an IRTE in a metropolitan area must start by the decision on the appropriate Co-operative Management level as the core component of the whole Integrated Environment. The efficiency of the transport system as a whole requires full co-operation between the different network managers (urban, motorway, public transport).

By integrating measures in the private and public transport sector, telematics systems for traffic information and control can improve traffic operation and result in positive environmental impacts.

QUARTET PLUS has shown that telematics provides the tools to make different operators work together efficiently in handling real time information and elaborating control strategies to meet variations in demand.

As long as real-time information displayed on the VMS are not fully reliable, travellers will tend to critically consider the messages displayed. They will tend to consult classical sources of information (radio for example). If the message is discrepant they will be more mistrusting of the message displayed. For this reason, accurate and timely information is considered to be a key factor.

In order to give the best results possible, it is necessary for Telematics projects as for infrastructure improvements, to be integrated in an appropriate planning framework. Considering the impact of Telematics in increasing network capacity, it is essential to have a strategy for using the spare capacity – to the benefit of public transport by reducing the space available to the private traffic, or to the benefit of urban comfort by limiting the growth of traffic demand in other ways. This strategy must be quickly enacted, otherwise new capacity can be soon lost to newly arising car trips, which make use of the improved traffic conditions.

ADDITIONAL INFORMATION

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