

DEMONSTRATION SITE:	PAN-EUROPEAN SURVEY
NAME OF THE DEMONSTRATION PROJECT (CASE STUDY):	STATE OF THE ART OF PUBLIC TRANSPORT INFORMATION
DURATION OF THE PROJECT:	SERVICES JANUARY 1996 – FEBRUARY 1997, CONTINUED BY INFOPOLIS 2, STARTING IN 1998
NAME OF THE TAP PROJECT:	INFOPOLIS – ADVANCED PASSENGER INFORMATION IN EUROPEAN CITIES

ABSTRACT

European Cities and Public Transport Operators are realising that high quality Public Transport Information is essential for attracting new passengers. Public Transport Users have a high demand for getting clear information about the different routes, timetables, fares, and other conditions that are available. Many Public Transport Information Systems have been designed for answering this need. However, most of them have been developed in isolation, without consideration of the need for a common interface.

Within the INFOPOLIS¹ projects a detailed analysis of Public Transport Information Systems currently in operation or being implemented in Europe.

The Public Transport Information Systems presented in INFOPOLIS are either passive, or interactive. Some are used collectively and some individually. The systems can be divided into:

- Public Access Terminals
- Enquiry Office Terminals
- Web Sites
- Home Terminals
- Hand-Held Terminals
- Station and Bus Stop Displays
- On Board Displays

Telematics-based Public Transport Information Systems will become increasingly important for attracting Public Transport passengers since they provide more reliable and almost real-time information, such as real waiting times at bus stops and service disturbances.

Future efforts for promoting Public Transport Information Systems should focus on those systems that are expected to have the highest user acceptance. Station and Bus Stop displays and

¹ INFOPOLIS is a horizontal project, in which six large city public transport operators are involved. The ultimate goal of the project is to produce guidelines and recommendations for European Standards for user interfaces to Public Transport Information. The INFOPOLIS Project has the objective to improve user access to Public Transport information by concentrating on the presentation and contents of information provided by telematic systems. The INFOPOLIS project has been realised in four phases:

- 1) A detailed analysis of telematic systems currently in use in the transport area, focusing on ergonomic features¹ and system functionalities¹.
- 2) A review of the state of knowledge in the field of the design and ergonomics of man-machine interfaces, and development of a range of standard tests
- 3) Evaluation of ergonomics of a certain number of existing information tools, with on-site tests
- 4) Production of a summary of findings, as an initial input to future European harmonisation.

Onboard Displays are those systems, which are used and appreciated by the vast majority of the Public Transport Users. Cities are also recommended to prepare for a wider use of Web Sites as an Information Media for Public Transport services.

BACKGROUND AND OBJECTIVES

One important factor to increase the attractiveness of Public Transport is to meet the users needs to be informed about the different solutions that are available to use Public Transport. Customers consider information as a key element of travel service and are looking for easy accessible information on timetables, fares, routes and conditions for the use of services.

Public Transport Operators have developed and implemented an increasing number of high performance tools that provide various operation management facilities: definition of services, line scheduling and production monitoring. Initially, these tools were used for network production management, which provide real-time information on the running of services and reaction to possible disturbances. Later on these systems were also used for customer information services (bus stop displays, public access terminals, etc.).

As a consequence of technical innovations the classic information media (network signs, maps, marketing leaflets) were complemented by new tools, which allow offering a higher information quality.

The INFOPOLIS project has the intention to facilitate the access of Public Transport Users to well-adapted and homogeneous Public Transport Information Systems. This will contribute to a far higher level of information for the citizens about the different possibilities to travel by Public Transport. This high quality of Public Transport information will attract more people to start travelling by bus, trams, or using Public Transport more often. This results in an improvement of mobility in large European towns and cities.

One important element of the project work of INFOPOLIS is a detailed analysis for existing Public Transport Information Systems, involving a study of the functionalities offered, the technologies used, and a review of user evaluation that are available.

STATUS OF EXISTING PUBLIC TRANSPORT INFORMATION SYSTEMS

The review of existing Public Transport Information Systems, which has been done within the INFOPOLIS projects, gives an overview of telematic-based Public Transport Information Systems currently in operation or being implemented in Europe.

In the INFOPOLIS project 53 systems have been analysed. The INFOPOLIS project ended in February 1997, but the technological progress determined the need of extending the study to other telematic systems and therefore in 1998 the INFOPOLIS 2 project was started.

In comparison to the INFOPOLIS study, the "Review of Current Passenger Information Systems" realised by INFOPOLIS 2 studied about 130 systems and 300 Web sites. New system families have been included in the study, besides those that have already been studied by INFOPOLIS. However evaluation results of the system are currently only available from the first INFOPOLIS project.

The following Public Transport Information Systems have been examined by INFOPOLIS:

- Public Access Terminals
- Enquiry Office Terminals
- Web Sites
- Home Terminals

- Hand-Held Terminals
- Station and Bus Stop Displays
- On Board Displays

1 Public Access Terminals (PAT):

Public Access Terminals are stand-alone units, usually located near PT network facilities, in stations or at stops. They are also located at places of high concentration of people such as public buildings, tourist locations etc.

The main goal of Public Access Terminals is to provide traveller information mainly before the journey or in some cases during the journey at connections.

The Public Access Terminal can display two kinds of information:

- travel information (optimum route, description of itineraries, how to access the PT network, etc.)
- general information (city cultural or commercial activities). Some of them can include ticketing machines.

The terminals are in the most cases autonomous and use local databases. There are some systems connected to distant databases and also in other cases, the same terminal is connected (directly or indirectly) with more than one system in order to provide multimodal information.

Most terminals are using colour video screens as output units. On some terminals the information is relayed or complemented by a synthetic voice. The majority of the devices are equipped with printers. The terminals are using traditionally keyboards, but the most recent ones are using touch screens as input devices.



Tipinfo use touch screen, 14" or 10" in LCD technology. Input of street or stop names by selecting from lists in several steps.

The FAHRINFO terminals (acronym: TIPINFO) provide the following information:

Optimum path (shortest journey time, minimum transfers or cheapest journey) between two points (stop names or addresses), taking into account all public transport modes (specific modes can be excluded) with line numbers, departure and arrival times, transfer times, total journey time, detailed journey information with walk to the stop.

Example TIPINFO - FAHRINFO public terminal (Germany)

Assessment of user acceptance and evaluation

PAT from their nature are addressed to people that feel more comfortable with new technologies. Thus, younger people are expected to be more frequent users than others, the oldest people being the less frequent PAT users. Furthermore PAT are not intended for the majority of every day users, but to special groups such as visitors, occasional users, and people who do not take the same route every day.

In this respect PAT users differentiate from the users of other Passenger Information System, and in particular the passive ones, such as Bus Stop Displays and On Board Displays.

Most PAT users believe that the information is reliable and accurate, although the lack of reliability of Terminals (mainly printers) has often been criticised.

In general there is little knowledge about the existence of such systems and most of the users are in general not willing to pay for these services considered as public assistance.

The disabled and elderly needs are taken into account in the half of the systems, for example constraints linked with wheelchair (access, angle and position of the screen, low keyboard), visual aid (size of characters, contrast of colours), hearing aid (visual information combined with audio messages).

2 Enquiry Office Terminal (EOT)

Enquiry office terminals are a particular category within this study because the users are not passengers but information personnel from transport companies. Their main purpose is to help the staff to answer customer questions. Generally, the information available includes the best path between two points, timetables, fares, etc. Some systems are connected to the control centre of the company and they can provide real time information such as bus passing times, disruptions etc.

Concerning the configuration, several types can be mentioned:

- Stand-alone workstations or workstations on a local network – the information comes from a local database and it is “off-line” information,
- Certain information systems are connected with the operating centre of the company and can provide additional real time information,
- In very exceptional cases information servers from different transport modes can be connected together.

All terminals are powerful workstations using a graphical interface and a geographic database. There are systems with an operator terminal and a documentation terminal that is updating the database.

Assessment of user acceptance and evaluation

Looking at those Enquiry Office Terminals considered in INFOPOLIS no real time information is available, tourist information is optional, but the trip planning function is available in all systems.

Enquiry Office Terminals, however, must provide different types of information and in alternative ways in order to satisfy most of the users requests. For this reason skilled and well-trained operators are needed. They should also have the ability to print the information for the passenger.

Most systems are using graphic interfaces. The dialogue should be more compact and the system's response time should be improved.

3 Web Sites

The Web Site is a very rapidly growing medium for Public Transport Information. There are some considerable differences between the Web Sites and the Public Interactive Terminal or Enquiry Office Terminals, even if they are using similar or identical databases, and may also share a common interface:

- Public Access Terminals (PAT) are usually provided by local government agencies, and Enquiry Office Terminals (EOT)—by these agencies or by operators. Web sites are increasingly being established by commercial public transport operators, as well as by local government agencies.
- On Web sites there are often advertisements for the Public Transport service offered by the company, whereas PATs and EOTs set out to inform rather than to advertise. This has resulted in a wide range of peripheral information being provided on Public Transport web sites, a wider range than is usually found on PATs, for instance.
- Web sites usually contain no features to assist the disabled to use them. The increasing use of features such as Java and Shockwave may actually make it harder for partially sighted people to use Web sites. The elderly are usually not considered at all in Web design, since it is expected that they won't be users of the Internet.
- Web sites are obviously at the upper end of the 'service quality' spectrum. There are, for instance, a lot of sites for airlines, but comparatively few sites covering bus services in rural areas.
- The Web provides the convenience of home and office access with the ease-of-use resulting from standard screen interfaces.

Assessment of user acceptance and evaluation

The number and use of Public Transport Web sites is increasing rapidly. The way in which information is displayed is an important issue and Web site designers need to take into account speed of screen update, an issue that is not very relevant for other PT information systems.

Since they offer the possibility of linking with other sites, they seem to be more suitable for multimodal application than other systems.

Regarding the ergonomic aspects the sites are often multilingual when the national language is not English.

However, due to the appearance of new features, there is an indication that certain sites are losing their ergonomic quality for certain categories of disabled and elderly people.

4 Home Terminals

Those who have the proper facility at home or at work are using home terminals. Nowadays most of them are PC's which either are connected through telephone lines to a PT information server, or operate as stand alone terminals. In the latter case the PT information is provided through a CD that is loaded into the PC.

Home terminals provide not only urban Public Transport information, but also inter-urban PT information. Many times home terminal are multi-mode systems, providing information about rail and air.

A very important role plays the French Minitel, being one of the few telematic facilities at a national level. It is considered the precursor of the Internet in Europe.

The information distributed by in-home systems is mainly pre-trip information, which gives information on best routes, timetables, fares, connections, and in some systems real-time

information is provided. In some cases Home Terminals also provide post trip information, and give the possibility to send suggestions or complaints and supply cultural and commercial information.

The information is pre-recorded either in a distant or local database. When real time information is available the control centre of the Transport Company is connected with the information centre.

Assessment of user acceptance and evaluation

Except Minitel, there is very poor data about the use of home terminals as transport information tools, and often the services are not used frequently. Some of the reasons why these systems are so little used can be that they are not very well known, the cost of the services is high and also a little weakness of information.

The use of Home Terminals, outside France or Germany, has only a low level of interest. They have been overtaken by Web Sites and by Portable Terminals that are providing more user-friendly facilities.

There is ground for improvement concerning the response time and, more important, concerning the costs of the home terminals.

5 Handheld Terminals

The Handheld Terminals appeared very recently as information tools in the field of transport and are entirely autonomous and portable. The traveller can consult them at any moment of the trip and in any place.

There are two types of terminals:

- non-communicating portables that provide pre-recorded information (descriptions of door-to-door itineraries, route, travel times etc.),
- communicating portables, which can give information at any time when they are connected with the control centre. Some of these terminals are functioning one way and can only receive information. There are also more advanced personal portables, which can access services from a service centre using the GSM standard for mobile communication (sometimes Internet services can be accessed).

The systems are using LCD screens for displays and keyboards, pencils or buttons as input interfaces. The most sophisticated use icons. Examples of applications are still quite scarce, and mainly remain at the experimental stage.

Assessment of user acceptance and evaluation

Many users requested find the Handheld Terminals very useful, the dialogue design is convenient for them and they agree to pay for having this service through a pager or mobile phone. Users believe that apart from the usual information, additional information on real-time disturbances or other similar information should be available.

The use of this system often seems to be difficult for those that are not familiar with computers and disabled and elderly people. The software should therefore be adapted to the logic of the user. Moreover, the readability of the screen should be improved by presenting only the relevant information. The users must be involved in the design process.

6 Station and Bus Stop Displays

Bus Stop and Station Displays are mainly used for provision of real time information. The main purpose of bus stop and station displays is firstly to reassure that the user is waiting for the PT vehicle at the right place and secondly to inform the user about the time required until the Public Transport means arrives. The latter also allows the user to exploit the time left until the estimated bus arrival.

However, in many cases bus stop and station displays are used for providing static information about Public Transport or other information and advertisements.

Bus stop and station displays are intended for the vast majority of PT users. Both regular and occasional users can benefit from a proper real time display. In this respect bus stop and station displays become a very important means for facilitating passenger life and therefore it is vital that it be well understandable and readable.

Real time information offered by bus stop and station displays require the existence of an Automatic Vehicle Location System which allows the location of all properly equipped vehicles in the PT network; thus it is possible to calculate the distance and hence the time required to reach a certain point (station, bus stop etc.) in the network.



Example VLA bus stop system in Turin gives the following information: real waiting time for the next vehicle and operator messages relating to the service (deviated lines, malfunctions, etc.)

Assessment of user acceptance and evaluation

These systems are among the most appreciated information systems because the knowledge of the waiting time greatly improves the conditions of the trip by removing any uncertainty and by minimising waiting time.

Surveys about the perception and the impact of such systems are indicating a high degree of satisfaction and awareness. Passengers consider this type of PT system very useful and they trust it in most cases. 25% of the analysed systems are taking into account the needs of disabled and elderly people needs.

Improvements can be made in the state of the readiness and also in the positioning of the displays. Standardisation and harmonisation are very important for this type of system.

7 Onboard Displays:

This type of systems was created in order to enable the passenger to get his/her bearing when the bus is moving (information on destination, the next bus stop and connections), and also to inform about the network and city activities (vehicles fitted with video screens that are broadcasting general cycling information).

On Board displays often offer audio information as well, so that a passenger can both see and/or listen to the information.

Like the bus stop displays On Board Displays are intended for the vast majority of PT users. They belong to the passive information systems, and they are often used to display advertisement or messages. In this respect they often have commercial value.

Real time information offered by on board displays requires a proper system to determine the location of the vehicle. The simpler system used is the odometer which enables the location of the bus along a predetermined route. Other most sophisticated systems may also be engaged.

For the most recent onboard systems, practical information (next stop to be served) is combined with other information (city, commercial activities) that is broadcasted in an entertaining way.



An example of Onboard display from Brussels is of particular interest. In fact, beside traditional onboard information system on certain route (in vehicle display of 13 characters), some vehicles are fitted with lateral and frontal banners, which display a dynamic waiting time. These systems inform passengers at stop of the departure time of the bus in question.

Assessment of user acceptance and evaluation

On board displays are found useful by most users but especially by those who use Public Transport only occasionally. They are becoming more important when they are displaying real time information on disruptions or on other special events.

Audio facilities are also greatly appreciated by the passengers, especially in cases where, within the vehicle, the full and visual contact between the passengers and on-board displays is not possible.

CONCLUSIONS

The telematic-based Public Transport Information Systems are going beyond the conventional media (timetables, network maps) by providing information, which is more reliable and almost real-time. There is an increasing number of Public Transport Information Systems that supply – in addition to timetables, routes, fares, etc.- new capabilities such as real waiting times at bus stops, real localisation onboard display, and service disturbances (planned or unexpected).

For the development of Public Transport Information Services in the last years, the following trends can be recognised:

- to make real time information available to the user,
- to extend information to multi-modal solutions,
- to make information available on a great variety of means
- to provide personalised data via interactive systems.

Technologies such as AVL, mobile communications and Internet are critical for these requirements and will be increasingly replaced by new services like pagers, PT web sites and interactive PT terminals. In a few cases, systems are able to provide true multi-modal solutions in real time; yet many of the new systems currently designed will embody multimodal features.

However, the assessment of user acceptance and the validation of implemented systems is not common, although concerns and user evaluations have become important requirements in the development of new PT information systems.

The promotion of telematics based Public Transport Information Systems should mainly focus on those systems that can make high quality information (e.g. real-time information) available to the majority of PT users. In particular Station and Bus Stop displays and On-board displays achieve a high degree of satisfaction and awareness, because the knowledge on PT services can improve considerably.

But also the information services for individual needs should be improved. When opting for Public Access Terminals as a tool to offer high quality pre-trip information, it is important to ensure a high degree of user friendliness. PAT should only be considered as an additional system to Information Centres, where the staff of transport companies gives individual information to customers. Information Centres should be equipped with skilled and well-trained operators and with Enquiry Office Terminals that ideally provide comprehensive information on different transport modes as well as real time information.

Moreover, cities should prepare for the use of Websites as a very important means of information delivery in the future. Web site designers have to take into account that the information is updated regularly and the interests of certain categories, like disable and elderly people are considered.

ADDITIONAL INFORMATION

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