

**Innovations in Transit Service and Operations (Click on section to go to article)**

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# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.1.1

CONCEPT:       Dynamic Scheduling and Routing

PROJECT NAME:   *FasTrak*

LOCATION:         Houston TX, USA

FasTrak is a jitney-like service designed to complement METRO's existing fixed-route bus service and, eventually, to replace unproductive bus routes altogether. FasTrak vehicles, owned and operated by private entrepreneurs, shuttle along METRO's regular bus routes within designated service areas. Individuals may flag FasTrak vehicles anywhere along the route and be dropped off at destinations up to one-quarter mile off the assigned route. Pre-arranged trips are prohibited in order not to create competition with private taxicabs. Operators establish their own fare, which must be published and posted in the vehicle. Operators get to keep all fares and, in addition, receive a fee of \$25/day from METRO for each vehicle they put out on the road for at least six hours a day. In return, they must comply with METRO-established maintenance, inspection and reporting requirements.

The FasTrak service was launched in May 1995, in the Westheimer Corridor in southwest Houston. Ridership peaked at 1,600 daily riders in the seventh week, and thereafter stabilized at 1,200-1,400 riders. Service was interrupted after nine weeks, but will resume late this year with a new operator who will run jitneys in the Westheimer and Bellaire corridors.

METRO intends initially to experiment with FasTrak as a supplementary service, in order to reduce peak period vehicle requirements and to relieve crowding on its own buses. In a second phase, METRO plans to eliminate unproductive bus routes and replace them with FasTrak service. The number of FasTrak vehicles permitted to serve each corridor will be specified by METRO in order to exercise control over the level of ridership loss on parallel public transit routes.

From METRO's perspective, FasTrak can benefit the riding public by providing faster and more direct service and offering the convenience of closer drop-offs to final destination. At the same time, METRO is able to move FasTrak patrons at a negligible unit cost. In the short run, some expensive peak hour runs may be trimmed from METRO's transit schedules; eventually, entire unproductive bus routes may be eliminated, thus saving METRO and the taxpayers significant sums of money. In sum, FasTrak benefits everyone.

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Center for Technology, Policy and Industrial Development  
Massachusetts Institute of Technology**

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.1.2

CONCEPT:       Dynamic Scheduling and Routing

PROJECT NAME:   *OmniLink*

LOCATION:         Prince William County

An innovative transit system, combining flexible feeder and circulation service, has been launched in Prince William County, a rapidly growing exurban county about 25 miles south of Washington DC. The new service, called OmniLink, began operation in December 1994 with the introduction of three "flag-stop" routes feeding two Virginia Railway Express (VRE) commuter rail stations serving Washington. Two more routes were added subsequently. In April 1995, daytime "flex-route" (i.e. route deviation) service began along three corridors, and three additional flex-routes were added in September 1995. Flexible routing within 1.5 mile-wide corridors enables OmniLink to reach a far larger market and dispenses with the need for complementary paratransit services required of fixed-route systems. Riders can access OmniLink service at bus stops, however if bus stops are too far to reach, riders can call 24-48 hours in advance to arrange for the bus to pick them up in their neighborhood. Standing orders for repeat trips are also accepted. To increase operating efficiency, buses are not required to return to the route at the point of deviation; instead, they may select the most convenient path that will bring them back to their usual route.

To enhance system operation, advanced communication technologies were introduced in the autumn of 1996 to provide vehicle tracking and real-time reservations capability. The goal was to reduce the 24-48 hour advance reservation period to just one hour. The ITS architecture includes a Global Positioning Satellite (GPS) vehicle location system, automated scheduling and dispatching software, a geographic information mapping system, and a digital communication system utilizing mobile data terminals. This architecture allows customer service agents to make both advance and real-time reservations, as well as check the schedules, manifests, current vehicle loads and schedule adherence of individual vehicles.

The use of intelligent transportation systems (ITS) technologies is particularly beneficial in rural and low density transit systems. These systems require a large degree of demand responsiveness and routing flexibility — capabilities that can be enormously enhanced by advanced communication and information technologies, such as AVL and wireless voice/data terminals.

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**     No. 4.1.3

CONCEPT:       Dynamic Scheduling and Routing

PROJECT NAME:   LINC

LOCATION:         Seattle WA, USA

The City of Seattle has proposed a far-reaching restructuring of its transit system. The proposed concept would replace the current route system focused on downtown Seattle with a system using multiple transit hubs located in neighborhood centers throughout the city. The new concept is called LINC (Local Initiative for Neighborhood Circulation). The transit hubs would be connected by limited-stop arterial bus service, affording rapid neighborhood connections. At the hubs, transfers would be made to vans or minibuses that would operate as circulators, picking up and dropping off passengers at their homes and other destinations within the neighborhood service area.

Two types of neighborhood service were tested: a fixed-route circulator and a flexible routing service. The latter, called "fixed-in/flex-out," involved vans that would depart the transit hub at scheduled times, delivering passengers to any location they requested within the service zone (the "flex" portion). After dropping off passengers, vans would return to the hub along a fixed route on local streets (the "fixed" portion). Both the circulator and the flexible route service operate without specified bus stops, permitting passengers to hail, board and get off the bus at any location along their travel path.

The LINC concept has been embraced by King County Metro, the county transit agency operating within Seattle and the surrounding King County. With 66 percent of King County's population living outside Seattle, and 60 percent of people living and working outside the city, a bus system focused on downtown Seattle no longer makes sense. Instead, Metro's six year operating plan, developed in concert with the newly constituted three-county Central Puget Sound Regional Transit Authority, calls for a web of transit routes that would tie suburban communities to one another. Metro's new plan seeks to place more reliance on feeder systems and transit hubs located at activity centers throughout the county, and the LINC concept, with its combination of fixed and flexible routes, is likely to play a central role in Metro's future service delivery strategy.

*Ref: Innovation Briefs, Nov/Dec '97*

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.1.4

CONCEPT:       Dynamic Scheduling and Routing

PROJECT NAME:   Nighttime Transit/Taxi Service

LOCATION:         Saint Briec, France; Salzburg and Vienna, Austria

The Saint Briec district in northwest France has negotiated an extension of its evening bus service with three local taxi firms. After the city bus shuts down for the night at 8 pm, the owner-operators of the taxicab companies operate a nine-seat minibus along each of the three main bus routes. The service is offered at half hour intervals between 8:15 pm and 11:15 pm. The rates are the same as single trips on the bus during daylight hours. The service is subsidized by the local authority as a convenience to residents at a substantially lower rate than it would cost to keep the city buses running at night

In Salzburg, the transit authority has arranged for coordinated, dynamically scheduled nighttime taxi service that meets transit riders at suburban transit stops and takes them directly to their homes. Operators of transit vehicles radio ahead to local private taxi companies to meet debarking transit riders at suburban rail stations and bus stops. The taxis provide shared-ride service, delivering passengers to their doorstep. Passengers pay only a small fee for this extra service, which is cross-subsidized by the public transit company.

In Vienna, eight urban bus lines offer radio taxi pickup to passengers at any stop along their routes in the suburbs. At a passenger's request, the bus driver will call a taxi to the designated stop using his radio link. The taxi will meet the passenger and take him to his final destination.

*Ref: Innovation Briefs, December '94*

# INTERNATIONAL MOBILITY OBSERVATORY

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.1.5

CONCEPT:       Dynamic Scheduling and Routing

PROJECT NAME:   *Chiamabus Crema*

LOCATION:         Milan, Italy

Chiamabus Crema is a dynamically scheduled and routed paratransit service, initially offered to students at the Crema campus of the University of Milan. Crema, situated about 40 km east of Milan and 25 km south of Brescia, is home of the Università di Milano Informatics faculty.

The service has been developed in response to a growing congestion and air pollution problem in the Milan metropolitan region. Traffic volume has increased more than 40 percent during the past decade and air pollution has led to restrictions on the use of private cars in central Milan. Changing travel patterns due to dispersal of home and work locations cannot be fully addressed by traditional public transportation with its fixed routes and predetermined schedules. In many ways, the situation in Milan is becoming similar to that in American metropolitan areas, with limited public transport and increasing number of cars with solo drivers.

When a customer calls for service, the computer-assisted dispatcher center checks the location and available capacity of the vans in the system, selects a vehicle, calculates the additional travel time required to pick up the customer and informs the customer of the time and place he will be picked up. A historical data base of vehicle operations helps to identify optimum scheduling and routing strategies. Digital road maps and real-time access to road traffic conditions help to estimate trip times and optimal routes.

All vehicles in the fleet are tracked in real time with the help of Global Positioning Satellite/Automatic Vehicle Location (GPS/AVL) technology. Continuous contact with vehicle drivers is maintained through GSM cellular telephones operated in Italy by Telecom Italia and Omnitel-Pronto Italia.

The Chiamabus system is the first example of computer-assisted paratransit in Italy. The system may eventually be extended to the entire 96,000 student body and 5,000 staff members of the Università degli Studi di Milano. Other candidates include several large office facilities

*Ref: Dr. Giorgio Valle, Università degli Studi di Milano, valle@dsi.unimi.it*

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.1.6

CONCEPT:       Dynamic Scheduling and Routing

PROJECT NAME:   *Pick-Up*

LOCATION:         Hannover, Germany

A satellite-based demand-responsive collective taxi service service has been launched in the Hannover region in early 1999. The pilot operation is gathering experience for potential nationwide application of this service concept.

The Hannover collective taxi employs minivans to serve low-density suburban and rural areas. It has no fixed routes or schedules and uses satellite communications for vehicle tracking, scheduling and communication between dispatch centers and vehicle drivers. Optimum route is computed based on passenger pick-up and destination points using a GIS navigation system developed by Bosch Blaupunkt.

The *Pick-Up* saves users the inconvenience of walking to and from a bus stop and increases passengers' feeling of security, especially after dark. A decision on whether to continue or expand the system will be made in 2000, based on the cost data collected. The service costs DM2 (\$1.20) on presentation of a season ticket and DM 5 without a pass.

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**     No. 4.1.7

CONCEPT:       Dynamic Scheduling and Routing

PROJECT NAME:   *SkyTrek/CabLink/CityNet*, Satellite-Based Taxi Dispatch Systems

LOCATION:         Singapore

Taxi companies in Singapore have initiated a satellite-based tracking and dispatching system in 1995-96. With the new system, the nearest taxi is located with the help of Global Positioning Satellite (GPS) system and then booking and routing are transmitted to the taxi driver's vehicle display unit in digital form by a dedicated Mobile Data Network. With the GPS system, taxi dispatchers know the precise location of all vehicles at all times. The system can find the nearest vacant cab, and the cab's display screen can tell the driver the passenger's location. The systems are able to handle eight times as many bookings as conventional telephone-radio dispatch systems.

Frequent taxi users can open an account with the taxi company by Internet or phone. Account holders can have their particulars, including expected pick-up points logged in the taxi company's computer. When a frequent user dials his PIN the computer will ask for his desired pick-up point. Using GPS, the system will track and locate a vacant taxi that is the nearest to the passenger's pick-up point. The system notifies the assigned driver via the Mobile Data Network. The passenger's pick-up point will appear on the display screen of the driver's mobile system terminal. Once the call is acknowledged by the driver, the system automatically contacts the customer and informs him of the taxi's license plate number through a synthesized voice message. The system allows customers to make bookings by telephone, computer terminals, and wireless portable terminals.

In spite of the limitations of the current GPS technology, Singapore's taxi companies find the new satellite-based system far more efficient, productive, accurate and reliable than the old radio-based system. Thanks to the new system, Singapore's fleet of more than 9,500 taxicabs has become a working component of the metropolitan mass transportation system.

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# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.2.1

CONCEPT:       Passenger Information Systems

PROJECT NAME:   Project *Countdown*

LOCATION:         London, U.K.

In London, Automated Vehicle Location (AVL) technology has been put to work communicating bus schedules to the public. Microwave beacons that "talk to" onboard transponders have been installed on signposts along a 10-mile bus route. The position of each bus, as it passes a beacon is flashed to a main control center which, in turn, transmits the information to electronic dot matrix displays at the bus stops, informing waiting passengers of the arrival time of the next bus as well as its destination — thus eliminating one of the most common sources of rider dissatisfaction with public transit.

To generate real time information, a location code is keyed into the radio by the bus driver each time the code changes. The central computer then constructs a real time "path" along the route using the known current location and registered destination of the bus. Forecasts of arrival times are computed according to current travel conditions, as reported by the actual passage of three previous buses along each section of the route. The data is then electronically transmitted to visual displays at each bus stop. For each of the buses approaching the stop, the route number, destination and minutes-to-arrival are presented in red LED characters.

London authorities hope to have 4,000 bus stops (a quarter of London's total of 17,000 bus stops) equipped with electronic information displays within five years. So far, over 350 bus stops have been equipped with electronic signs showing arrival information for 30 routes and benefiting some 70 million passenger a year.

*Ref: Traffic Technology International, Autumn 1995, p.66*

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:        **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**        No. 4.2.3

CONCEPT:        Passenger Information Systems

PROJECT NAME:

LOCATION:         Linz, Austria

To help make the public transit system more attractive, the light rail system of Linz, Austria is installing a real-time passenger information system. All 248 bus and trolleybus stops on the network are being equipped with electronic dot matrix signboards that show in real time the number of minutes before arrival of the next train and its destination. Where several lines use the same stop, the display shows the waiting time for the next train to each destination. Dot matrix displays inside the cars announce the next stop to the passengers.

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.2.4

CONCEPT:       Passenger Information Systems

PROJECT NAME:   *Infobus*

LOCATION:         Paris, France

Infobus consists of a pocket-size pager which provides the traveler with information concerning the schedule of the next five buses expected at the traveler's chosen bus stop in the designated direction. The system has been tested in the Paris suburb of Neuilly and is currently being tested in Metz. A total of 2000 bus users are taking part in the trials which involve 12 local bus routes and 130 buses. Infobus is also being tested in another Paris suburb, Chatou.

The data is provided by the transit systems' fleet monitoring centers which use automatic GPS vehicle monitoring (AVM) systems (see, 4.3.3). The data is sent to the Infobus paging service which, in turn, transmits the data to the pagers.

The pagers contain a memory that is four times greater than that of conventional pagers. This enables the unit to calculate the waiting time for buses by comparing timetable data (updated hourly) with the exact position of the buses, transmitted every 30 seconds. By performing the comparisons every 30 seconds, the infobus pager can determine each vehicle's speed and then calculate its likely arrival time. In addition to giving bus information, the Infobus pager can also receive personal messages.

*Ref: ITS International, May/June 1997, p.59; Innovation Briefs, Nov/Dec '97*

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## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.2.5

CONCEPT:       Passenger Information Systems

PROJECT NAME:

LOCATION:         Mannheim, Germany

Electronic displays which inform waiting passengers of the arrival time and destination of the next bus or train are within the state-of-the art, and wireless communication systems have made their installation at bus stops economically feasible.

Lately, passenger information systems have also been introduced in urban light rail systems. The Transit Authority of Mannheim, Germany (MVG), has tapped the Global Positioning Satellite (GPS) technology to track its fleet of 15 light rail articulated train units and provide waiting passengers at street car stops with up-to-the-minute information not only about the arrival time of the next tram but also about the position of all the train units along the entire length of the line.

# INTERNATIONAL MOBILITY OBSERVATORY

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.2.6

CONCEPT:       Passenger Information Systems

PROJECT NAME:   Mobility Centers

LOCATION:         Wuppertal, Germany; Graz, Austria

In Wuppertal, Germany, a multimodal one-stop mobility information center has been established by the local transit operator, the Wuppertaler Stadtwerke AG (WSW) and the German Railways. Known as *MobiCenter*, its services include information about public transport (timetables, fares, park-and-ride facilities, car and bike rental), ticket sales and reservations on German Railways' intercity lines, car rental reservations, carpool matching and trip planning consultation. The *MobiCenter* also has taken over the operation of a local car sharing scheme. Customers can make reservations for shared cars at the center which is centrally located in Wuppertal's pedestrian precinct.

A similar Mobility Center, known as *Mobil Zentral*, operates in the city of Graz, Austria. The primary aim of the center is to offer assistance to carless travelers, including ticket sales, bicycle hire, car-sharing reservations and carpool matching information

*Ref: Momentum newsletter, Autumn 1998*

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# INTERNATIONAL MOBILITY OBSERVATORY

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.2.7

CONCEPT:       Passenger Information Systems

PROJECT NAME:   *NextBus; BusCall; TransitWatch*

LOCATION:         Bemidji MN; Seattle WA, USA

A new generation of portable devices providing real-time alerts of bus arrival are making their appearance in the United States. All these systems are based on accurate knowledge of bus location and the maintenance of a large statistical database of the segment times required for each route. Vehicle location is determined using Global Positioning System (GPS) satellites. This location is communicated back to the bus operations center by radio. The center's computers use a database to calculate when the bus will arrive at each stop along its route. The arrival time messages are then sent to portable devices via paging frequencies. The devices receive and decode the signals into "next bus arrival" messages.

A local service provider in Bemidji, Minnesota has deployed 10 test units of a GPS real-time tracking system that allows parents to know when a school bus arrives to pick up or drop off their children. *BusCall* utilizes two-way communication between equipped buses and the telephone company. The telephone company sends a message to subscribers via telephone, e-mail or pager. Typically, *BusCall* service rings with a distinctive tone on a family's home telephone when the school bus is approaching the nearest stop. The parent answering the call hears a message revealing how soon the bus will arrive.

In Seattle, real-time bus arrival times for various routes are displayed on special video monitors located at the transit center. The project, named *TransitWatch*, is part of the Puget Sound area *Smart Trek* program (see, 3.1.9). Other monitors will be installed at major employment sites, such as the Boeing Company's Renton facility.

*Ref: Understanding and Applying Advanced On-Board Bus Electronics, TCRP Report 43 (1999)  
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# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**     No. 4.3.1

CONCEPT:       Bus Fleet Management

PROJECT NAME:   AATA System

LOCATION:         Ann Arbor MI, USA

The Ann Arbor Transportation Authority (AATA) serves over four million passengers per year with 27 bus routes and paratransit service for seniors and disabled individuals in the Ann Arbor/Ypsilanti, Michigan area. Though national public transit ridership rates are declining, AATA continues to buck the national trend by showing an average annual increase in ridership of eight percent.

Since 1996, AATA has been progressively introducing a series of technological innovations in an effort to attract new customers and better meet customer needs. The new technologies include an advanced communications system, an automatic vehicle location (AVL) system employing global positioning satellite (GPS) technology, and a computer-assisted transfer management and dispatching system.

The AVL system permits the exact location of each bus to be determined at all times. By comparing scheduled times and locations with actual locations, drivers and the Operations Center can determine whether they are on time. If a bus is shown to be running late, drivers and dispatchers can take corrective action to restore regularity of service. This includes the ability to pre-empt traffic signals to give the bus priority.

The AVL also is used to provide timely passenger information. Displays at bus stops show the destination of the next arriving bus, and inside the bus visual and audible announcements are made concerning the next stop. Graphic displays announcing the arrival and departure of each bus will also be installed at the main downtown transit center.

The Operations Center remains in constant communication with each bus, using a radio and on-board computer, with a graphical Mobile Display Terminal. Drivers can use the system to alert the Operation Center of an onboard emergency and to facilitate passenger transfers.

*Ref: Innovation Briefs, Nov/Dec '97*

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**     No. 4.3.2.

CONCEPT:       Bus Fleet Management

PROJECT NAME:   *Travlink*

LOCATION:         Minneapolis MN, USA

The Travlink project was undertaken on a demonstration basis for the purpose of improving the commute from the western suburbs of Minneapolis to its downtown along 11 miles of a transit-intensive corridor of Interstate 394. Eighty buses of the Twin Cities' Metropolitan Council Transit Operations (MCTO) were specially equipped with an automatic vehicle location (AVL) system working in conjunction with the global positioning system (GPS) and a geographic information system to gather and update information affecting the bus riders' travel. A GPS receiver on each vehicle provided position to the vehicle's on-board processor which then displayed to the driver automatic messages concerning the vehicle's status and location. The same signals were also sent to the central dispatching center. In simple terms, the bus determined its own status and then informed both the driver and the dispatcher.

The real-time vehicle status information was communicated to a traveler information system which, in turn, made it available to commuters in four ways: (1) Electronic signs, located at four park-and-ride lots along I-394 listed the next five buses scheduled to arrive and their status (on time, late, etc); (2) Display monitors were installed at two park-and-ride lots listed the next 10 buses scheduled to arrive and their status; (3) Interactive touch-screen kiosks provided transit and traffic information (current bus status, routes and schedules, detours, major incidents, etc) at three locations in downtown Minneapolis; (4) An on-line system allowed employees to access an electronic bulletin board on personal computers in their offices.

The test has been concluded and evaluated. Travlink has been discontinued because the transit company could not afford to continue the project on its own after the demonstration funds ran out.

*Ref: "Travlink: An Intelligent Commute in Minneapolis," ITE Journal, June 1996*



# INTERNATIONAL MOBILITY OBSERVATORY

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.3.3

CONCEPT:       Bus Fleet Management

PROJECT NAME:   *Altair*

LOCATION:         Paris, France

RATP, the transportation company for the city of Paris, has begun using a satellite communications system called *Altair* to monitor the position of its buses running in the busiest corridors. Data from the GPS system is communicated to a control center and to bus stops along the route, where it is displayed on LCD screens. Passengers waiting for a bus know to within a minute when the next one is due to arrive. The system was developed by a consortium of French companies.

# INTERNATIONAL MOBILITY OBSERVATORY

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.3.4

CONCEPT:       Bus Fleet Management

PROJECT NAME:   GPS-Based Automatic Vehicle Location (AVL) Systems

LOCATION:         Various locations in USA

By far the most prevalent sign of technological change within the U.S. transit industry has been the accelerating pace of installation of GPS-based Automatic Vehicle Location (AVL) systems. Coupled with computer-aided dispatching and wireless communication systems, AVL systems are producing benefits in terms of passenger security, travel time, schedule adherence, service reliability and cost-effectiveness. A recent study (*ITS Technologies in Public Transit: Deployment and Benefits*, US DOT, November 1997) has found 24 transit systems employing AVL systems and another 31 in various stages of procurement.

Safety and system productivity have been major factors behind decisions to install AVL systems. Transit operators report an increased sense of security and improved on-time performance with AVL-equipped buses.

*Ref: "AVL Systems for Bus Transit," TCRP Synthesis 24 (1997)*

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.4.1

CONCEPT:       Track Sharing

PROJECT NAME:

LOCATION:         Karlsruhe, Germany

Since September 1992, residents of outlying suburban communities in the Karlsruhe region in southern Germany can go to their local train stations and board a city tram that will take them directly and without transfer into the center of Karlsruhe. This seamless commute is made possible through a track-sharing agreement that allowed the municipal light rail system to extend its service some 30 km (18 miles) into the surrounding region, utilizing existing track of the German Railways (Deutsches Bahn or DB). Only 3 km of new track had to be laid to connect the streetcar network to DB's heavy rail system. Specially designed rail cars, equipped with on-board transformers and rectifiers can operate on the railway's 1500 volt AC current and switch effortlessly to the 750 volt DC current used by the urban light rail system. This track sharing service between the suburb of Bretten and the center of Karlsruhe has eliminated an interline transfer and reduced commuter trip time by almost 50 percent, from one hour to about 37 minutes.

Inspired by Karlsruhe's success, many other cities throughout Europe are negotiating similar track-sharing agreements to extend the reach of their city tram systems into the surrounding suburbs. In October 1997, the city of Saarbrücken (pop. 300,000) near the French border inaugurated its own dual-mode tram-train network. The service links the center of Saarbrücken with the French town of Sarreguemines, 17 km to the south. A northern extension to Lebach is also being planned. The Saarbahn system will ultimately consist of a 46 km network of rail lines of which only 17 km will be newly built track. The remainder consists of existing rail trackage of the German Railways (DB) and French National Railways (S.N.C.F.). Sharing track with the regional railways allowed the project to be completed much sooner and at considerably lower cost than constructing a completely independent system.

The track sharing fever has also spread to France and England. Currently, eight French cities are planning to extend service on their municipal tramways beyond city limits by using suburban rail lines of the S.N.C.F.. They include Mulhouse, Nantes, Grenoble, Orleans, Rouen, and Dunkerque. In Britain, the most advanced project is that in Nottingham (pop. 750,000) which happens to be a "sister city" of Karlsruhe. The Nottingham Express Transit (NET) will run its light rail trains on city streets in the town center and use the track of an existing suburban commuter rail line beyond city limits.

*Ref: Innovation Briefs, Jul/Aug '98; Rev. 5/98*

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**Cooperative Mobility Program  
Center for Technology, Policy and Industrial Development  
Massachusetts Institute of Technology**

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.5.1

CONCEPT:       Transit Marketing Strategies

PROJECT NAME:   “Bus Card Plus”

LOCATION:         Phoenix AZ, USA

In 1991 the City of Phoenix Public Transit System implemented a program known as Bus Card Plus, which billed employers for trips made by their employees, using employer-issued credit cards. Employers distribute the special cards to eligible employees. The card is similar to a commercial credit card, with a magnetic stripe on the back containing a card identification number. Four years later, in late 1995, Phoenix introduced a commercial credit card bus fare payment program.

Upon entering a bus, a rider swipes his card through the card reader installed on the bus. Phoenix Transit downloads the credit card transactions from the bus card readers on a daily basis and submits them to the participating employers and commercial credit card companies, as the case may be, on a monthly basis. Since the electronic farebox on the bus is not part of an interactive network, it cannot check the validity of the commercial credit card account in real time. However, an updated "hot list" of invalid credit card numbers is loaded into each farebox daily, thus minimizing the risk of fraudulent charges.

The objective of the commercial credit card fare payment program is similar to that of the original Bus Card Plus program: to attract riders to the bus system by enhancing the convenience of using the system. Electronic transactions also benefit the transit agency by making bus loading more efficient, eliminating the burden of cash handling, reducing the opportunity for fraud, and producing more accurate ridership counts.

*Ref: "Using Credit Cards to Pay Bus Fares in Phoenix," Federal Transit Administration, Report DOT-VNTSC-FTA-96-1, January 1996*

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:        **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**        No. 4.5.2

CONCEPT:        Small Town Bus Systems

PROJECT NAME:

LOCATION:         Germany, Switzerland, Austria

Within the last few years, more than a dozen smaller communities in Germany, Switzerland and Austria have introduced local bus systems in efforts to reduce private car use, lower pollution and improve the quality of life. These operations are sponsored either by municipalities or municipal utility companies and operated by contract providers. In the latter case, the operation is cross-subsidized from the profits of other utility operations.

Carrying distinctive city emblems, the small town bus systems operate all day long on headways as low as 15 minutes along clearly marked routes from a central terminus, usually at the railway station. Bus shelters equipped with amenities like benches, public phones, mail boxes and bicycle storage stalls, are paid for entirely by advertisers. Other enhancements include reliable schedules, low-floor buses, clearly marked color-coded routes, timed transfer between lines at the main terminus, ticket vending machines, traffic signal priority for buses and distribution of pocket guides and schedules to all households. The bus systems also practice full fare integration: a single ticket or a monthly pass is accepted by all service providers throughout the region.

The small town bus movement has led to remarkable increases in local ridership. In places like Schaffhausen, Switzerland (pop. 34,000), Dornbirn, Austria (pop. 42,000) and Lindau, Germany (pop. 25,000), ridership has more than tripled.

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.5.3

CONCEPT:       Innovative Transit Marketing Strategies

PROJECT NAME:

LOCATION:         Various locations in Germany

German transit operators have devised a wide variety of innovative marketing strategies to attract riders to public transit. They include:

- Contracts with major employers for company-subsidized transit passes
- Heavily discounted monthly flash passes and annual flash passes sold at an even heavier discount; on weekends and during off-peak periods the flash passes can be used by up to four family members.
- Arrangements with sponsors of sports events and theatres to honor their tickets as transit passes
- Agreements with local taxi operators to provide late-night demand-responsive services to transit patrons at outlying transit stations
- Advance checking of shopper's parcels during holiday seasons at special shoppers buses parked at the edge of pedestrian zones
- Arrangements with departments stores and car rental agencies to offer rebates to bearers of annual transit passes

*Ref: Innovation Briefs, December '94*

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.6.1

CONCEPT:       Privately-Provided Transportation Services

PROJECT NAME:   *Kids Kab*

LOCATION:         Various locations in USA

*Kids Kab* is a privately-operated transit service for children, designed specifically to meet the needs of today's busy working families. It offers individually customized door-to-door transportation to and from school, after-school activities, orthodontist appointments, music lessons and weekend social and sports events. Because safety and security are uppermost in parents' minds, children are issued photo identification cards that become their bus admission ticket. Children will not be left unattended unless they are greeted at the door by a parent or other pre-approved person. To allay parents' fears of turning their children over to strangers, drivers are carefully screened, with emphasis on hiring mothers, school bus drivers and retired neighbors living in the service area.

The service was created by Pamela Henderson, a working mother of three children in Birmingham, Michigan. From its humble beginning in 1991 with three vans and manual dispatching, the business has expanded into a far-flung network of franchises in 12 states that collectively carry 50,000 riders a month. The fast growth of *Kids Kab* — and numerous imitators — demonstrates that there is a booming market for customized transportation services focused on children and young teenagers.

The service is offered by subscription and on a single-ride basis. In some communities, *Kids Kab* carries students to and from classes at independent schools that do not have school bus transportation of their own. Peak demand occurs after school, with vans carrying children to sports activities, music and dance lessons and dentist appointments. Weekends are also periods of high demand for transportation to sports events, birthday parties and dances.

*Kids Kab* fills a niche that was formerly filled by stay-at-home mothers. With more and more mothers joining the workforce, the function of chauffeuring children, like that of taking care of pre-schoolers, is increasingly taken up by professional providers.

*Ref: Innovation Briefs, May '93*

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.7.1

CONCEPT:       Electronic Payment Systems

PROJECT NAME:   *Transcarte*

LOCATION:         Paris, France

The use of proximity smart cards as a transit fare medium is expanding rapidly overseas. The benefits of smart cards are obvious. They speed up bus boardings, eliminate the need for cash transactions and cash collections, reduce fraud, have safeguards against theft (when reported lost or stolen, the card can be electronically "blacklisted" to prevent further use), provide a capability to have a more complex regional fare structure, and enable transportation operators to have more accurate ridership data.

The RATP — the Paris Regional Transit System that carries nine million passengers a day — has developed and is testing a smart card which will one day replace the current magnetic-stripe card, in use since 1960. The RATP smart card will combine the stored-value debit card features of the widely used French telephone card with the "contactless" reading capability of a supermarket check-out counter. The card will also have the capability of being used for other public payment purposes, such as utility bills. One version of the card now being tested (in the Valenciennes region, north of Paris) includes a digital display of the remaining stored value. The decision to convert to smart cards has been driven by the increasingly complex regional fare structure which has swamped the limited capacity of the magnetic stripe system, and by the desire to make the card forgery-proof.

The information stored by the *Transcarte* also serves the RATP for data collection on passenger flows, line use, rush hour loads, etc. These data are used by planners to implement service changes.

In London, more than 200 buses, operated by five private companies over 19 routes in the Harrow district of northwest London, are also equipped with proximity smart card readers. More than 15,000 passengers have already obtained the credit card-size pass. The 18-month test involves two types of smart cards. A prepaid seasonal pass; and a proximity (contactless) debit fare card from which the cost of each trip is deducted and which can be recharged after its stored value is used up.

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# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.7.2

CONCEPT:       Electronic Payment Systems

PROJECT NAME:   *Octopus*

LOCATION:         Hong Kong

The European tests are dwarfed by a massive \$53 million smart card project now being introduced in Hong Kong. Hong Kong's five major public transport operators have jointly adopted a stored value smart card system which will be used by an estimated 3 million daily passengers and employ more than 5,000 smart card readers. The Hong Kong system will be replacing an aging magnetic stripe system which, like the Paris system, is running out of capacity to accommodate complex fare structures.

Proximity smart cards combine the stored-value debit card features of the widely used telephone cards with the "contactless" reading capability of a supermarket check-out counter. The benefits of smart cards as a transit fare medium are obvious. They speed up bus boardings, eliminate the need for cash transactions and cash collections, reduce fraud, have safeguards against theft (when reported lost or stolen, the card can be electronically "blacklisted" to prevent further use), provide a capability to have a more complex regional fare structure, and enable transportation operators to have more accurate ridership data. The transaction, including card-processor authentication and data encryption, takes place in about one-third of a second, making it possible to handle high volumes of passenger traffic without any loss in productivity. Economics also favor the smart card. Microchip costs have been declining by 30-50 percent annually and the cost per data bit now favor the smartcard by a factor of 10. Finally, the smartcards are reliable. The minimum guaranteed life of the cards is 100,000 transactions, or seven to ten years. This compares to 120 transactions for the life of the currently used stored value magnetic strip cards.

The CSC *Octopus* system (so named because of its multi-modal applications that reach out like tentacles and include urban rapid transit, light rail, buses and ferries) is currently used by an estimated 2.5 million daily riders. Company officials expect that there will be four million electronic smart cards in use by the end of 2000 when all forms of public transport in Hong Kong have converted to the smart card system.

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# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.7.3

CONCEPT:       Electronic Payment Systems

PROJECT NAME:   *FahrSmart* and Lufthansa *ChipCard* Contactless Smart Cards

LOCATION:         Germany

Two cities in northern Germany, Lüneburg and Oldenburg, have taken the lead in making public transport attractive by using contactless smart card technology. The municipal transport authorities are offering cashless payment to their passengers, thus increasing both convenience for the users and savings for the operator.

Card holders get on the bus or train without having to purchase a ticket in advance and simply present the card at the card reader at a distance of about 10 cm. The card does not even have to be taken out of a wallet or purse. Within milliseconds the card reader device registers the ID number stored in the card, compares entrance and exit parameters and stores the data in the mobile bus memory unit. Data is transmitted from each mobile memory unit to a central computer.

At the end of each billing cycle, the cardholder's bank account is debited with the total cost of the rides. Passengers without a bank account or who want to remain anonymous can purchase a contactless prepaid stored value "debit" card.

Contactless cards also have been introduced by Lufthansa in lieu of tickets on some of their short-haul flights, notably Frankfurt to Berlin. Air passengers present their Lufthansa ChipCard at a reservation booking computer terminal. The computer verifies seat availability and displays the flight details on a screen. At this point, the passenger has the choice of either accepting the indicated booking and seat reservation or request another reservation. The whole procedure is completed in less than 10 seconds, doing away with lengthy check-in procedures. The passenger receives a print-out of his seat number and a printed receipt. Upon boarding the aircraft, the passenger simply presents his ChipCard when going through the boarding gate.

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.7.4

CONCEPT:       Electronic Payment Systems

PROJECT NAME:   Stored Value Bank Card

LOCATION:         Atlanta GA, USA

Transit operators everywhere are recognizing the potential of Electronic Payment Systems (EPS) to increase travelers' convenience and improve operating efficiency. Already installed in numerous cities in Europe, North America and Asia (see, 4.7.1, 4.7.2, 4.7.3), Electronic Payment Systems are proving popular with travelers as they discover the convenience of cashless fare payment. Transit operators are equally enthusiastic, as fare accountability, cash handling and data collection are enhanced and streamlined.

Electronic Payment Systems simplify the adoption of a common fare card for multiple transit modes and provide the means for multiple operators to honor the same card. Electronic Payment Systems enable automated accounting of transfers and simplify ridership data collection, while greatly expanding data collection capacity. Additionally, stored value bank cards (not to be confused with credit or debit cards) offer the promise of transferring cash handling tasks from transit operators to banks.

In Spring 1996, VISA International, in partnership with several banks in the Atlanta metropolitan area, introduced VISA Cash, a type of stored value bank card. Unlike debit or credit cards, a stored value bank card stores electronic cash directly on the card itself, enabling fast, off-line transactions. Working with VISA, the Metropolitan Atlanta Rail Transit Authority (MARTA) put VISA Cash card readers in fare gates at all their rail stations. Today, travelers can use VISA Cash on transit and at participating retail establishments.

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.8.1

CONCEPT:       Service Deregulation

PROJECT NAME:   *FasTrak*

LOCATION:         Houston TX, USA

FasTrak is a jitney-like service designed to complement METRO's existing fixed-route bus service and, eventually, to replace unproductive bus routes altogether. FasTrak vehicles, owned and operated by private entrepreneurs, shuttle along METRO's regular bus routes within designated service areas. Individuals may flag FasTrak vehicles anywhere along the route and be dropped off at destinations up to one-quarter mile off the assigned route. Pre-arranged trips are prohibited in order not to create competition with private taxicabs. Operators establish their own fare, which must be published and posted in the vehicle. Operators get to keep all fares and, in addition, receive a fee of \$25/day from METRO for each vehicle they put out on the road for at least six hours a day. In return, they must comply with METRO-established maintenance, inspection and reporting requirements.

The FasTrak service was launched in May 1995, in the Westheimer Corridor in southwest Houston. Ridership peaked at 1,600 daily riders in the seventh week, and thereafter stabilized at 1,200-1,400 riders. Service was interrupted after nine weeks, but resumed later with a new operator running jitneys in the Westheimer and Bellaire corridors.

METRO intended initially to experiment with FasTrak as a supplementary service, in order to reduce peak period vehicle requirements and to relieve crowding on its own buses. In a second phase, METRO eliminated unproductive bus routes and replaced them with FasTrak service. The number of FasTrak vehicles permitted to serve each corridor is specified by METRO in order to exercise control over the level of ridership loss on parallel public transit routes.

From METRO's perspective, FasTrak can benefit the riding public by providing faster and more direct service and offering the convenience of closer drop-offs to final destination. At the same time, METRO is able to move FasTrak patrons at a negligible unit cost. In the short run, some expensive peak hour runs may be trimmed from METRO's transit schedules; eventually, entire unproductive bus routes may be eliminated, thus saving METRO and the taxpayers significant sums of money. In sum, FasTrak benefits everyone.

*Ref: Innovation Briefs, March '93*

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.8.2

CONCEPT:       Service Deregulation

PROJECT NAME:

LOCATION:         United Kingdom

In the United Kingdom, bus deregulation started in the mid-1980s under the Thatcher government. An act of Parliament made competitive bidding of public bus service a requirement in London in 1984. The London approach involves so-called "managed competition." All bus routes are put out for competitive tender. However, London Transport (LT), a public authority, has retained the power to regulate service and fare levels. This includes determining routes, timetables and fare structure, and setting service and vehicle specifications. Private providers can bid for single routes or networks of routes. Contracts are let for up to three years, with renewals of up to another three years. Nearly 40 companies provide service under competitively awarded contracts.

Public transportation in the rest of the country was deregulated in 1986. The act of Parliament gave full freedom to private carriers to determine fares and schedules. Today, more than 75 percent of public bus services are operated commercially. The remaining services, determined to be "socially necessary" and often serving low density routes and at low demand times (evenings and weekends), are contracted.

Ten years after the deregulation of bus services in Britain, bus lines in London have gained in ridership while those in other parts of the country have registered a marked decline. The results are reported in a recent study, *Buses in London: A comparison with the rest of Great Britain*, published by London Transport. There is general agreement, however, that bus deregulation has been on the whole beneficial. Operating costs declined by 23.5 percent in London and 30 percent outside London during the period 1986 to 1995. For the same period, total subsidies decreased by 48.3 percent in London and 28.8 percent outside London. The London approach of managed competition through competitive tendering appears to have been more successful in reducing unit costs per passenger than the total deregulation approach adopted in the rest of the country.

*Ref: Innovation Briefs, March/April '99*

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# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.8.3

CONCEPT:       Service Deregulation

PROJECT NAME:

LOCATION:         Finland, Sweden, Denmark

Scandinavian countries have been aggressively pursuing a policy of turning the operation of urban and rural transit services to the private sector. **Finland** has contracted out all of its metro area bus services in a phased program that was completed in early 1996. Regional bus lines will be put out to tender in 1997. Only the city of Helsinki is still in business as a transit operator in the capital region, along with 14 private companies and the state railways. The progressive opening of the market through competitive bidding brought in two big Swedish bus companies, Linjebus and Swebus, and reportedly reduced operating costs by nearly a third. In the capital region the farebox currently covers about 55 percent of operating costs; local government picks up the rest.

In **Sweden's** capital of Stockholm, 60 percent of the bus and regional train services are operated by both public and private carriers, which won the tenders beginning in 1992. Since then, the cost of operating public transit has fallen sharply — by almost a quarter for the bus operations and 17 percent for the Stockholm metropolitan rail operations. These cost improvements have been accomplished without any deterioration in service; indeed, additional improvements and amenities continue to be made in both the bus and rail service.

In **Denmark**, where farebox operating return for the Copenhagen metro area is also on the order of 55 percent, nearly two-thirds of the bus lines have been contracted out to private operators. The competition in the bus operation market has led to a drop in operating cost and improvements in service. Copenhagen Transit Authority (HT) collects all fare revenues and pays the contractors the costs stipulated in the tender. HT notes that serving the region and sparsely populated areas around the clock, as is mandated by law, will continue to require subsidies, but the amount of subsidy has decreased since the service operation has been turned over to the private sector.

*Ref: Innovation Briefs, March/April '99*

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY: **INNOVATION IN TRANSIT SERVICE & OPERATIONS** No. 4.8.4

CONCEPT: Service Deregulation

PROJECT NAME: *Postbus* Service

LOCATION: Switzerland

Switzerland's famed *Postbus* Service which, since 1849, has been transporting passengers and mail to the farthest reaches of the country, is no longer a government monopoly. Although the Swiss government still fully owns the postal system and its *Postbus* subsidiary, 80 percent of the *Postbus* services are now contracted and the remaining 20 percent that are operated directly by *Postbus* are subject to the same competitive bidding requirements as the contract carriers. Switzerland's new Railway Act aims to create market conditions in regional public transport. Cantonal authorities (similar to U.S. states) now decide on and place orders for transportation service. Private companies submit their bids and are selected on a competitive basis. The original purpose of *Postbus*, to bring regular passenger and mail service to isolated mountain villages, continues to this very day. Where demand is low, the familiar yellow *Postbus* vehicles have been replaced by on-call services, known as *PubliCar*. A flexible low-cost transportation service for thinly-populated rural areas, called *Mobile*, has also been launched. *Postbus* services operated by private contractors carried over 90 million passengers in 1997 over 685 routes totaling 8,500 km.

*Ref: Innovation Briefs, March/April '99*

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# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.8.5

CONCEPT:       Service Deregulation

PROJECT NAME:

LOCATION:         Japan, Australia, New Zealand and South America

Throughout the world, the practice of turning the operation of public transportation systems over to the private sector has accelerated in recent years. Known in its various forms as deregulation, privatization, outsourcing, contracting, franchising and competitive tendering, the aim is always the same: to improve service quality and performance of public transport by injecting competition and entrepreneurial approaches into service delivery.

Deregulation and outsourcing do not necessarily imply complete privatization. In many cases, government retains policy-making functions (decisions about routes, fares, schedules and service standards) and contracts with private providers for service operation. Service contracts are awarded competitively to the lowest responsible bidder. In some cases, employees of a public transit agency may themselves compete for contract awards.

### **Japan, Australia and New Zealand**

In Tokyo and Osaka, Japan, private subway lines have been operating on a fully integrated basis with municipally-owned systems for many years. Most major cities throughout Australia — Adelaide, Melbourne, Sydney and Perth — have converted or intend to convert to competitive bidding. This includes bus as well as rail services. In New Zealand, a 1990 act of Parliament required that all public transport services be provided commercially or under a "competitive pricing procedure." Prior to that, most public transportation services were provided by public authorities. Deregulation under the new regime began in July 1991 and the reforms were completed in 1996.

### **South America**

Bus and jitney service has been privately provided in the cities of several South American countries for many years. In the 1990s, privatization has been extended to rail systems in some cities. In Buenos Aires, for example, long-term concessions to operate the metropolitan subway and commuter rail systems were granted to three private consortia following a disastrous deterioration in service, equipment and facilities under public management. The results were dramatic. Ridership on the systems has more than doubled since privatization

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# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.8.6

CONCEPT:       Service Deregulation

PROJECT NAME:   Transit-Taxi Cooperation

LOCATION:         France

More than 60 cities and urban regions throughout France are partnering with local taxi companies to provide subsidized services to residents late at night and in sparsely populated areas without regular bus service.

Almost half of all French jurisdictions at the departmental level have organized on-call, demand responsive services, three quarters of which are contracted out to local or regional taxicab companies. The French *Union des Transports Publics* has signed a partnership agreement with the French National Federation of Taxicab Owners (FNAT) that affirms that both industries share a common goal of providing public transportation service in a non-competitive manner. FNAT has publicized case studies of effective cooperation and has developed a model agreement to be used by their 15,000 members when entering into partnership agreements with public transportation authorities.

*Ref: Public Innovation Abroad, March 1999*

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# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.9.1

CONCEPT:       Innovations in Light Rail Transit (LRT)

PROJECT NAME:

LOCATION:         Various cities in Europe and North America

The light rail transit (LRT) renaissance that began some 15 years ago continues unabated. Since 1980, all urban rail transit projects launched in North America have been light rail systems. No less than 21 U.S and Canadian cities operate light rail transit today, compared to five cities that had functioning precursor streetcar systems in 1975. Eight existing LRT systems are undergoing expansion and one new system is under construction. Eight new LRT projects are in planning or conceptual design stage. Nor is the LRT renaissance confined to North America. In Europe, most rail transit projects launched since 1980 also have employed light rail technology. They include Nantes (1985) Grenoble (1987), Strasbourg (1995), Rouen and St Etienne in France; Manchester (1992), Sheffield (1994), West Midlands and south London in the United Kingdom; plus system expansions in Gothenburg, Amsterdam, Basel, Zurich, Bern, Turin, and numerous German cities.

The reason for the revival of this technology is not accidental. In an era characterized by escalating construction costs, LRT offers promise of affordable rail technology to aspiring cities that could not muster sufficient resources to build full fledged heavy rail systems. LRT's less obtrusive vehicles and guideways are more "environmentally friendly," and its ability to operate as single cars or as trains give transit operators more flexibility to adjust to fluctuating traffic loads. Moreover, light rail systems can be developed incrementally, a few miles at a time, and do not require the long lead times associated with heavy rail construction. In short, light rail transit offers a more versatile and cost-effective rail transit alternative, especially to newer cities whose density patterns could not justify high capacity systems.

Enhancing light rail operations is a family of technological innovations pioneered by the European Commission-sponsored program PROMPT. The innovations include low-floor vehicles, signal pre-emption giving priority to LRT vehicles, electronic passenger information systems, computer-controlled monitoring of LRT operations, and use of elastomeric materials in track bed to dampen noise and vibration.

*Ref: Innovation Briefs, April '95*

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.9.2

CONCEPT:       Innovations in Light Rail Operations

PROJECT NAME:   *CITADIS*

LOCATION:         France

A third generation light rail vehicle, named *Citadis*, has gone into operation in France. Manufactured by GEC Alsthom, the vehicle has been under development for several years. The low-floor lightweight vehicle can operate on simple lightweight rails embedded in concrete instead of the complex supported rails required by heavier conventional LRVs. According to its builder the *Citadis* lightweight infrastructure will cost 30 percent less than conventional urban light rail, or \$14-16 million/mile. Three versions of the *Citadis* are being offered, in lengths of 60, 85 and 90 feet.

*Ref: Mass Transit, Sep/Oct '97*

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# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.10.1

CONCEPT:       Waterborne Transit

PROJECT NAME:   Commuter Ferries

LOCATION:         San Francisco, Seattle, Boston, Vancouver, New York City, USA

For years, transportation planners viewed ferry boats as an eccentric adjunct to urban transit systems. But as suburbs continue to grow and funding for roads and rail transit projects dwindles, ferries have seen a surge of attention. At least nine cities are now served by commuter ferries. They include San Francisco, Seattle, Vancouver, Boston, and New York. In New York, ferry ridership from New Jersey to Manhattan across Hudson River has climbed more than 30 % annually. In Boston, ferry service has begun from Scituate on the South Shore to downtown Boston. In Vancouver, the SeaBus, which began in 1977 carries nearly 5 million riders. San Francisco's ferry ridership increased to 30,000 daily riders following the 1989 Loma Prieta earthquake but has leveled out at about 8,000 daily riders. A new, privately-operated ferry service between the city of Richmond and downtown San Francisco is expected to raise this number to 10,000 daily riders.

More than half the commuter ferries in the U.S. have been started in the past decade. Expectations are that, as congestion grows, more and more cities with rivers and port facilities will turn to ferries as a complement to their transit systems.

A privately sponsored Task Force for Bay Area Water Transit has recommended a massive expansion of the region's waterborne transit service. In the next 10-20 years, the task force envisions a first-phase fleet of 70 high-speed ferries, expanding to 120 crafts that would serve a network of dozens of routes and terminals around the Bay, including airline passengers and cargo terminals. The task force estimates 25-30 million passengers a year would ride ferries to work and for recreation and entertainment.

*Ref: Bay Area Transactions, March 1999*

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# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.10.2

CONCEPT:       Waterborne Transit

PROJECT NAME:   *Thetis Service Center (TCS)*

LOCATION:         Venice, Italy

Venice is one of the few cities in the world without cars, but it suffers from traffic congestion nevertheless, because of the great number of *vaporetti* and other craft plying its canals, lagoons and surrounding sea area. The management of waterborne traffic is made all the more challenging by a series of problems unique to the city. High tides may prevent some craft from passing under bridges, while low tides can make certain routes too shallow to be navigable. The speed of waterborne traffic must be strictly controlled to minimize wave motion which erodes building foundations. Venice also has its own parking problem, due to the inadequate mooring places along the canal banks. Traffic management is further complicated by heavy fog during the winter months.

To meet this complex traffic management challenge, the Venice municipality and its public transport authority (ACTV) which runs a fleet of *vaporetti* (water buses) has created the Thetis Traffic Management Service Center (TCS). The main task of the TCS is to monitor the canals, the lagoon and surrounding sea areas, manage traffic on the waterways, and provide reliable real-time information and instructions to the *vaporetti* and other vessels concerning traffic flows, weather conditions, tides, canal navigability (e.g. headroom under bridges) and other waterway conditions. An array of detection equipment, including GPS, radar and video cameras allow the Thetis Center to monitor traffic and issue emergency instructions. Each *vaporetto* is equipped with a GPS receiver and a VHF transmitter to provide real-time position of the craft and communicate with the Thetis Traffic Management Service Center. The Thetis communication system will be progressively extended to other craft operators

*Ref: ITS International, March/April 1999*

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# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.11.1

CONCEPT:       Bus Rapid Transit

PROJECT NAME:

LOCATION:         Curitiba, Brazil

Bus Rapid Transit (BRT) — as its name implies— is intended to mimic rail transit. BRT service typically involves operation in dedicated rights-of-way in the suburbs and in exclusive bus lanes on city streets. Headways are short, and enclosed stations equipped with high platforms facilitate rapid loading and unloading of passengers. Fares are collected upon entering the station, not on entering the bus, in order to speed up boarding and reduce dwell time at stations. The overall intent is to give bus service some of the qualities it currently lacks: faster operating speeds, greater service reliability, and increased comfort and convenience, matching the quality of rail transit service.

Probably the most celebrated example of Bus Rapid Transit is Curitiba, in southeastern Brazil. Curitiba authorities have used land use legislation to encourage high density residential and commercial development along radial corridors. Each of the five main corridors consists of three parallel roadways. The central road contains two express bus lanes, flanked by frontage roads carrying local auto and truck traffic. One block away to either side run high-capacity one-way arterial streets heading into and out of the central city. Express buses—some of them double- and triple-length articulated buses that can carry up to 270 passengers—operate at high frequency in the center lanes which are reserved exclusively for buses. Traffic signal preemption at intersections allows the buses to travel at an average speed of 18 miles an hour, twice the average speed of auto traffic. Large bus terminals at the far ends of the five express busways and smaller terminals located approximately every two kilometers along the express routes permit transfers from express to local buses. Most urban bus systems require passengers to pay as they board. Curitiba's distinctive plexiglass-clad tubular bus platforms, eliminate this step: passengers pay as they enter the tube and board the buses through extra-wide doors. The heaviest busway corridor carries 27,000 riders in the peak hour, far exceeding the daily ridership on most U.S. light rail lines. Although the city has more than half a million private cars (more cars per capita than any other Brazilian city) three quarters of all commuters — more than 1.3 million passengers a day — take the bus.

*Ref: Mass Transit, May/June '97*

5/99

# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:        **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**        No. 4.11.3

CONCEPT:        Bus Rapid Transit

PROJECT NAME:

LOCATION:         Northern Virginia, USA

A proposal for a Bus Rapid Transit system has been made public in the United States in February 1999. The project, proposed independently by two engineering firms, Bechtel and Raytheon, calls for a 23-mile busway linking Washington's Metrorail system with Dulles International Airport in Northern Virginia along one of Northern Virginia's busiest and most congested corridors. The busway would be built in the median of the existing Dulles Access Road. Station platforms would be accessed by pedestrian bridges spanning the highway. Fares would be collected upon entering the stations in order to speed boarding. Specially designed buses would run every 90 seconds during rush hours, and would be capable of carrying 52,000 daily passengers.. The \$180 million proposal was prompted by a recent Virginia law that allows private companies to build and operate major transportation projects if they can do it more cheaply and efficiently than public authorities. The proposal is contingent upon obtaining an adequate right of way within the median of the Dulles Toll Road which is owned by the Federal Aviation Administration. The busway could be converted later into a rail link that authorities believe will ultimately be necessary to serve the airport and its expected 32 million annual passengers by 2020

*Ref: Innovation Briefs, March/April '99; Toll Roads Newsletter December '98*

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# INTERNATIONAL MOBILITY OBSERVATORY

## INNOVATION FACT SHEET

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STRATEGY:       **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS**       No. 4.11.2

CONCEPT:       Bus Rapid Transit

PROJECT NAME:   Transitway

LOCATION:         Ottawa, Canada

Ottawa's Transitway, built in stages between 1978 and 1996, is a 25 km dedicated busway leading from the suburbs to the central business district where it connects to a network of exclusive bus lanes on city streets. Approximately 190 buses operate in the peak hour in each direction carrying more than 200,000 daily passengers. Buses run every 3 minutes during peak hours, every 5 minutes during the day, and every 10-15 minutes in the evenings. Fifty express routes provide peak period service between the suburbs and the central business district. Forty local routes provide timed transfers at 18 Transitway stations. Service on the busway is provided with articulated buses, with proof-of-payment fare collection to speed boarding .

Ottawa is making the Transitway a focus of future development in the region. Already, 34 percent of the region's employment is within walking distance of the Transitway. By the turn of the century, the goal is to have 40 percent of the region's employment located within walking distance of the Transitway. Close to \$1 billion of development has occurred or is committed close to the Transitway. In the future, all primary employment centers (downtown and suburban) employing more than 5,000 persons will be located at existing or future Transitway stations. Smaller employment centers will be allowed off the transitway but must have access to frequent all-day feeder service to the Transitway.

*Ref: Public Transport International (UITP), Feb '99  
5/99*