INNOVATION FACT SHEETS

Table of Contents (Click titles for articles)

EXEMPLARY METROPOLITAN MOBILITY SYSTEMS

- Curitiba, Brazil
- Hong Kong
- Houston TX, USA
- Ottawa, Canada
- Portland OR, USA
- Strasbourg, France
- Stuttgart, Germany
- Zurich, Switzerland

Rev. June 2001

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.1.4 Rev

CONCEPT: Limiting Car Access to City Centers

PROJECT NAME: *Zona a circolazione limitata*

LOCATION: Bologna, Italy

To combat growing air pollution and congestion, Bologna's authorities instituted a traffic restraint system that allowed non-residents automobile access to the historic town center on alternate weekdays, depending on whether their license plates ended in an even or odd number. When this approach failed to reduce atmospheric pollution and congestion, city authorities created a Limited Traffic Zone (LTZ) in the inner city to which car access is limited to residents of the LTZ and a select group of nonresident cars (e.g. those driven by disabled persons) and delivery vehicles.

To enforce this prohibition, an electronic sentry system was installed at each entry point into the controlled area. Special video cameras read the license plates of each entering vehicle. The registration number is electronically transmitted to a central computer data bank, which contains vehicle registration numbers of all the authorized vehicles. If the license plate number does not appear in the data bank, the system transmits the offending vehicle's registration number to a central violation center for appropriate notification and fine by mail (the enforcement system is not yet operational). The entire process takes but a few seconds.

The system is claimed to be violation proof and has proved to be so effective that the number of violations has dropped precipitously since the system was installed in 1996.

Ref.: Pietro Caselli, Elettronica Santerno, "Limiting Traffic Automatically," Traffic Technology International, 1997.

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.1.8

CONCEPT: Limiting Car Access to City Centers

PROJECT NAME: European Car-Free Day 2000

LOCATION:

On February 5, 2000 the European Commission and nine EU member countries launched the European Car-Free Day initiative. The initiative is designed to "raise awareness of the need to change mobility patterns," in the words of the EU announcement.

The Car-Free Day 2000 Initiative follows the success of the "In town without my car" days held in France in 1998 in 35 cities, and in France and Italy in 1999 in a total of 158 cities. In 1999, 22 million people were said to have participated in the campaign, with more than 80 percent wishing to see the experiment repeated regularly in the future.

The Car-Free Day initiative is sponsored and administered by the Car-Free Cities, a network of some 70 European cities which was created in 1994 by EU's Directorate General for the Environment "to develop and exchange good practices in the field of sustainable mobility by local authorities."

Source: European Union press release, 2/5/2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.1.9

CONCEPT: Limiting Car Access to City Centers

PROJECT NAME: Access Control

LOCATION: Rome, Italy

As part of its five-year mobility management plan, the city of Rome is introducing a traffic management scheme aimed at restricting automobile access to the historical center. The scheme calls for the creation of an automated access control system for an area of approximately five kilometers square containing some of the most valuable historical heritage. Access control will be exercised through the use of electronically monitored unmanned gates. The gates will be equipped with TV cameras and microwave transponders, enabling remote identification and tarification of vehicles seeking access to the cordoned area.

The entry gate system was completed in early 2000. The exit gate installation will be completed in a second phase in 2001. This will allow the system to differentiate between user categories (residents, deliveries, tradesmen, etc) and to assess fees according to the length of stay within the cordoned area. The entire system is expected to manage approximately 250,000 trips a day.

All access and exit gates will be remotely monitored. Two-way voice communication between the central monitoring center and the drivers seeking access to the cordoned area will be established.

In addition to the access control system, Rome's mobility management plan calls for a traffic monitoring system, a traveler information system involving 36 variable message signs along principal arterials, and a parking management system.

Source: Traffic Technology International, June/July 1999

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.2.3

CONCEPT: Residential Traffic Calming

PROJECT NAME: Vauban auto-free community

LOCATION: Freiburg, Germany

Vauban, a suburb of Freiburg, is the oldest German experiment in car-free urban living. This residential community, a mere 10-minute bike ride from the city center, was intended to reflect the values and lifestyles of this environmentally conscious region. Vauban was conceived as a car-free community where home buyers who pledged allegiance to carless living got priority for the subsidized bargain-priced building lots. Half of the homes in condominium-like clusters have no driveways or parking along their narrow access roads. Parking is officially prohibited everywhere except in private carports attached to the other half of the homes and in a common community garage which costs about $24 a day.

But Germany's most advanced experiment in car-free living has run into some practical problems and has been gradually scaled down to an "auto-reduced" community. Those who want a parking space with their homes – the first compromise retrofitted into the project, ostensibly to accommodate car sharing, have to pay an extra $17,000. Despite the high cost, half of the households in Vauban now have private parking spaces, and many of the other homeowners keep cars hidden in nearby lots or parked on adjacent public streets – much to the dismay of the project's idealistic planners who envisioned Vauban as a completely carless community. "I still like the idea of auto-free living, but in the long run, people just can't get by without some access to a car," one of the originators of Vauban was quoted as saying.

Source: Los Angeles Times, May 9, 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.3.2 Rev

CONCEPT: Car Sharing

PROJECT NAME: Station Cars

LOCATION: San Francisco Bay Area, USA

The "Station Car" concept calls for small, battery-operated automobiles that are provided to commuters at suburban rail stations. Making such cars available at both ends of the suburban trip enables commuters who currently require personal automobiles to use public transit instead. The station-to-home scenario envisions a home-bound commuter picking up the car at the station in the evening, placing it on charge at home overnight, and returning it to the station the next morning. The station-to-work scenario starts with office-bound commuter picking up the car upon arrival at a suburban rail station, driving it to work, using it for various errands during the day, and returning it to the station on the way home. Station cars may be reserved in advance or accessed by walk-up travelers. The station car can also be reserved for certain regular trips each day through a long term lease.

To determine consumer acceptance of "station cars," the National Station Car Association conducted a series of limited-scale tests in 1986-7 in Boston, the San Francisco Bay Area, Connecticut, New York, and South Florida. Sponsors of the tests were several electric utility companies (Calstart) and transit authorities. The goal of the Association is to learn enough from the small-scale demonstrations to justify a large-scale national demonstration.

The test cars were converted Geo Prisms and electric cars built by a Norwegian consortium, PIVCO (Personal Independent Vehicle Company). The latter, known in Europe as "City Bee," is a two-passenger vehicle with a range of 145 km. (See also 1.3.10)

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.3.3 Rev

CONCEPT: Car Sharing

PROJECT NAME: *Praxitèle*

LOCATION: Saint Quentin-en-Yvelines (Paris Region), France

In France, the concept of the shared car has been married to the technology of the electric car. In October 1997, Renault, in cooperation with the municipality of Saint Quentin-en-Yvelines, EDF and Thomson-CSF, launched a demonstration of a shared-car system, employing its electric *Clio* vehicles, already in production. The field test, named *Praxitèle*, employs a fleet of 50 *Clios* stationed at strategically sited "Praxiparcs." Subscribers can pick up a car at any station and drop it off at any other station, employing smart cards with their individual code to gain access to the vehicle. Upon return to a parking station, the car is automatically connected to a recharging mechanism. The vehicles are equipped with cellular phones linked to the central control facility to facilitate information and assistance.

The decision to proceed with the field demonstration in Saint Quentin-en-Yvelines, 20 km sw of Paris, followed successful trials in 1993-94 with an earlier version of the *Clio* in La Rochelle in western France. In a first phase, from October 1997 to June 1998, the *Praxitèle* demonstration employed 30 cars and 5 parking stations and used a manual access and billing system. Beginning in June 1998, the demonstration employs 50 cars and 14 stations and uses a contactless smart card, which enables customers to use the system 24 hours/day, seven days/week. Five of the parking stations include a charging mechanism. Users pay $9/30 minutes in peak period and $5/30 minutes in off-peak period, plus $0.17/for each additional minute

The demonstration is being monitored closely. Latest surveys (November ‘98) show monthly system usage at 1,300 trips. 72 percent of the users live in Saint Quentin-en-Yvelines, and 54 percent live close to a *Praxitèle* station. The cars are used for shopping (44%), trip to work (26%), and recreational trips (30%). Preliminary conclusion is that the shared car system can serve as an off-peak internal circulation system for low-density urban areas. Based on the results to date, Renault plans to replicate the demonstration in other cities.

Ref: Innovation Briefs, Nov/Dec 1997;

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.3.6 Rev

CONCEPT: Car Sharing

PROJECT NAME: Car Sharing Organizations in Germany

LOCATION: Germany

The oldest car sharing organization in Germany is the *StattAuto Berlin*, founded in 1988. It and its counterpart in Hamburg have joined forces in the summer of 1998 to create *StadtAuto Drive,* which collectively disposes of a fleet of 350 vehicles and has 6,500 members. Another German car cooperative, *StadtAuto Bremen*, has 75 vehicles and 1,700 members. Both organizations, as well as smaller cooperatives in other German cities are experimenting with intelligent transportation system technologies, notably smart cards for making reservations and facilitating billing, automatic vehicle location (AVL) systems to track the vehicles in real time, two-way communication, and remote diagnostics. *StadtAuto Drive* has been experimenting with a variety of innovative marketing schemes, such as *CashCar,* which allows members to make leased vehicles available for shared car use when they are out of town and *MobilCard,* which allows users to charge taxi fares. *StadtAuto Drive,* like its Swiss counterpart, is partnering with major car rental companies to provide vehicles to its members at reduced rate during holidays when carsharing demand is at a peak.

Germany's Federal Transport Ministry commissioned in 1996 a market study to determine the current and potential membership in automobile cooperatives and their impact on total car ownership and usage. According to the study, the 150 existing German auto cooperatives currently have 15,000 members. Collectively, they remove 2,900 vehicles from the road and eliminate 1.7 vehicle kilometers of travel. The analysis estimated a total of 2.45 million of potential cooperative users nationwide. If the full potential of auto cooperatives were to be realized, a total of 1.2 million vehicles would be removed from the road, resulting in a reduction of 3.7 million vehicle kilometers of travel.

Ref.: Susan Shaheen et al, Carsharing: An International Perspective, TRB Record No. 990826, April 1999; Klaus Zellmer, Institut fur Automobilwirtschaft, Geislingen, Germany; Rev. 5/99

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.3.10 Rev

CONCEPT: Car Sharing

PROJECT NAME: *Car Link*

LOCATION: San Francisco Bay Area

CarLink is part of Bay Area Rapid Transit's (BART's) Station Car Program designed to increase use of BART by providing convenient, innovative ways to get people to and from the transit stations. With parking space at BART stations severely limited (only 42,000 parking spaces available throughout the whole system), the station car concept is of interest to the transit agency because it can serve both an inbound and an outbound commuter with a single parking space.

Using 12 low-emission Honda Civic sedans powered by compressed natural gas, the program allows participating commuters to share fleet cars that use a BART station as their hub. Each car has a potential for three distinct uses a day: to and from residence to the BART station; to and from the BART station to work site (Livermore Lab); and midday use at the workplace. All refueling is done at the worksite using Livermore's CNG refueling facilities already in place. On weekends, the cars are taken home and used for local trips by the participating households.

An electronic vehicle locator system will track the vehicles, and manage the fleet. Access to operating the vehicles will be controlled with a smart card using technology developed in Germany and used extensively in car sharing programs throughout Europe.

Ref: CarLink: A Smart Car Sharing Demonstration in Dublin/Pleasanton, CA, Susan Shaheen, Institute of Transportation Studies, UC Davis

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.3.12

CONCEPT: Car Sharing

PROJECT NAME: Car Sharing in Europe - An Update

Nonprofit organizations that lease cars on a short-term basis have been in existence in Europe for over 10 years. The European Car Sharing Association estimates a total membership of 50,000, with 2,500 cars at more than 700 locations. The idea behind car sharing clubs is that people who only require occasional use of a car will no longer need to own their own vehicles. Operating costs are met through annual membership fees and hourly charges. Car sharing organizations have progressed beyond their environmental grass-roots origins and are becoming a recognized service industry with a business-like approach.

The oldest car sharing organizations are those of **Switzerland**. The Swiss car sharing program, begun in 1987, now operates in 600 locations in 300 communities, with over 20,000 members. A national umbrella organization, *Mobility CarSharing Switzerland* (MCSS) was created in May 1997 as a result of a merger of *Auto Teilet Genossenschaft (ATG)* and *ShareCom.* In 1998, MCSS launched a new service that provides a combination of car sharing, public transit, car rental, and taxi. The program, known as *Zuger Pass Plus (ZPP)*, is a partnership with the regional transit company, Hertz and local taxi companies. ZPP provides discounts on car rentals, taxi services and car sharing co-op annual fees, as well as priority service for the car sharing organization's vehicles. In September 1998, another partnership was launched with the Swiss National Rail System, offering a mobility package to all 1.5 million pass holders of the Swiss Railway System (SBB). The arrangement provides SBB pass holders with special discounts and smart card-facilitated access to the car co-op's vehicles.

In **Germany**, *StadtAuto Drive* (a merger of Berlin's and Hamburg's car sharing cooperatives) has a fleet of 350 vehicles and has 6,500 members. Another German car cooperative, *StadtAuto Bremen*, has 75 vehicles and 1,700 members. Both organizations, as well as smaller cooperatives in other German cities, are utilizing innovative technologies such as smart cards for making reservations and facilitating billing, automatic vehicle location (AVL) systems to keep track of vehicle fleets in real time, two-way communication systems, and remote diagnostics.

Britain's first automobile cooperative began in March 1999 in Edinburgh, Scotland. The "City Car Club" is a joint initiative of the City Council and a local car rental company. The scheme is designed to tie in with Edinburgh's car-free housing subdivisions where residents pledge not to own private cars in return to easy access to low-cost rental vehicles (similar to the German *Wohnmobile*). Members pay an annual membership fee to join the club and then pay by the hour for access to a car which is parked within the housing subdivision.

In **Italy,** nine cities (including Rome, Milan, Florence, Turin, Bologna and Venice) participate in a government/European Union-sponsored car sharing program. Each participating city has a fleet of 500 electric vehicles and all cities employ uniform fees and interchangeable smart cards

Source: Susan Shaheen, "Pooled Cars," ACCESS, No. 15, Fall 1999

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.3.13

CONCEPT: Car Sharing

PROJECT NAME: Car Sharing in Japan – An Update

LOCATION:

In October 1997, Honda Motor Company launched the *Intelligent Community Vehicle System (ICVS)* at their Montegi site. The system comprises several lots from which users (Honda employees) can select four different types of electric vehicles for short-term rental. Smart cards unlock and start the car. User fees are calculated automatically and deducted from the users' stored value cards. The lots and vehicles are instrumented with AVI technology, which allows the ICVS management center to monitor vehicle location in real time. Vehicles are equipped with an auto-charging system that instructs the vehicles to dock at a charging terminal when batteries are low.

Toyota is about to start a demonstration project of a shared-use transportation system using its small two-seat *Crayon* electric vehicle. The demonstration will be conducted in Toyota City (Aichi Prefecture), the site of the company’s headquarters, using a fleet of 35 *Crayon* cars. The cars, which have a 180 cm wheelbase, will be equipped with GPS and mobile phone. Participants in the experiment will make reservations electronically and pick up the car at one of eight staging locations. A dispatch center will monitor the location, movement and recharging status of each vehicle constantly. If the driver attempts to leave the designated area of use, the Crayon Center will send an automatic warning. Toyota views the Crayon systems as a potential precursor of a self-drive taxi system for business centers, residential housing developments, trips to and from suburban train stations, and tourist use in resort areas.

Source: Innovation Briefs, November/December 1999

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.3.14

CONCEPT: Car Sharing

PROJECT NAME: Station Car Rental Service

LOCATION: San Francisco Bay Area

A station car rental program designed to increase use of BART by providing a convenient way to get people to and from the transit stations has been launched in cooperation with Hertz. A station car is a car that is shared by several users each day for access between a transit station, homes and work. With parking space at BART stations severely limited (only 42,000 parking spaces available throughout the whole system), the station car concept is of interest to the transit agency because it can serve both an inbound and an outbound commuter with a single parking space.

Using conventional gasoline-powered cars, the program will allow subscribing commuters to share fleet cars that use the BART Fremont station as their hub. Each car has a potential for three distinct uses a day: to and from residence to the BART station; to and from the BART station to work site; and midday use at the workplace. Hertz plans to charge home-end users and corporate work site users $400/month for premium service that includes a guaranteed parking space near the station entrance. The rental program is an outgrowth of the shared-car *CarLink* demonstration project using CNG-fueled cars. (see, 1.3.2 and 1.3. 10)

Source: Innovation Briefs, Nov/Dec 1999

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.3.15

CONCEPT: Car Sharing

PROJECT NAME: *Flexcar*

LOCATION: Seattle WA, Portland OR, California

North America has been slow to recognize carsharing as a legitimate transportation option, but now there are two formal neighborhood-based car sharing programs in the United States and active car sharing groups in five Canadian cities. In Seattle, a privately-sponsored initiative, *Flexcar,* was launched in January 2000 with the backing of the local city and county government. *Flexcar* offers a low cost alternative to owning a car for residents of city neighborhoods who need a vehicle only occasionally. For $3.50 an hour and 90 cents a mile, customers can rent a Honda Civic on a on-demand basis. Or, they have the option of signing up for monthly access by paying a $250 initiation fee and $20 a month. The car sharing system has about 12 to 15 members for each of its cars. As the system grows, *Flexcar's* sponsors hope to make short-term rental cars available at the end of bus and rail lines, making public transit accessible to more suburbanites. To make *Flexcar* easier to use, the company plans to incorporate smart card technology (already used in Europe) to automatically bill members for car usage.

In yet another effort at making the system customer-friendly, an integrated web-based reservation system will be introduced later this year to complement the present telephone reservation system. As of May 1, *Flexcar* reports over 200 members and a fleet of thirteen cars based in two residential neighborhoods. *Flexcar's* goal is to have a fleet of 200+ vehicles and 3000 members in two years.

In Portland, Oregon, a similar cooperative, *CarSharing Portland*, has been in operations since March 1998. The coop has about 240 members sharing 14 vehicles at 12 locations in downtown and close-in city neighborhoods. The fleet consists mostly of Chrysler Neon compact cars. Recently, a Honda *Insight* electric hybrid vehicle has been added. Other specialty vehicles are planned to be added as the cooperative grows. A computerized reservation system (CARS) is used to facilitate fleet management and vehicle reservation. A third project is taking shape in California under the auspices of WestStart-CALSTART, a statewide non-profit consortium dedicated to the promotion of advanced transportation technology and non-polluting forms of propulsion.

In Canada, small car sharing groups exist in Toronto, Montreal, Quebec City, Vancouver and Victoria BC.

Source: private correspondence; press releases

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.4.5

CONCEPT: Innovative Marketing

PROJECT NAME: Automakers Embrace the Internet

LOCATION:

Faced with growing competition from online car retailing services, the major U.S. auto makers are changing their traditional marketing strategies by making a more extensive use of the Internet. The move comes at a time when online car sellers, such as *Autobytel.com* and *CarsDirect.com*, are offering consumers a chance to shop for and purchase cars directly online, without having to set foot in an auto showroom and haggle over price. The Internet-based auto retailers are rapidly creating a sort of virtual market for cars, where buyers are able to enter a specific model and options and obtain price quotes from various dealers who have that model in stock. Customers can then choose the best offer and have the car delivered to the front door. This pressures dealers to post more realistic invoice prices – what a car actually sells for – rather than an inflated "manufacturer's suggested retail price." Car manufacturers, in hopes of retaining Web-shopping consumers, are making their own web sites more consumer friendly by disclosing the invoice prices they charge the dealer. Ford's vice president of global marketing, James C. Schroer, speculates that cost-plus pricing may become the accepted practice, replacing the arduous negotiations that now take place in the dealers' showrooms.

General Motors Corporation has announced the formation of an alliance with Edmunds.com a leading internet source of unbiased automotive information, to offer consumers increased ease of obtaining information about GM products on the Internet. The site will allow consumers to custom-build their GM vehicle online and determine its availability at a nearby GM dealer's lot.

Source: Innovation Briefs, March/April 2000; GM Press Release, February 21, 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.7.1 Rev

CONCEPT: Innovations in Car Design

PROJECT NAME: The *Smart*

LOCATION: Germany

The movement toward luxury mini cars has found its ultimate expression in Mercedes' new entry, "*Smart*", launched in October 1997 by Micro Compact Car (MCC), a joint venture of Daimler-Benz and the Swiss entrepreneur Nicolas Hayek, inventor of the "Swatch" watch. Only 2.5 meters long and 1.5 meters wide (8 ft long, 5 ft wide), and seating two persons, the *Smart* is meant as a maneuverable "city car"–an asset in the crowded centers of European cities where streets are narrow and parking space is at a premium. The car fits comfortably in one half of a conventional parking space. The *Smart* is not intended for intercity trips. However, Mercedes' market research indicates that more than 80 percent of cars in Europe are driven less than 30 km per day. Although the vehicle only weighs 720 kg (1,590 lbs), its rigid unit construction and two air bags make it as safe as a conventional car, according to its manufacturer. At the same time, the *SMART*'s 0.6 liter (55 HP) engine consumes only 4.8 liters/100 km (51.6 mpg), making it the most economical and environmentally-friendly car on the market. Despite its small size, the *Smart* is surprisingly sophisticated technologically. It is equipped with a mobile phone and a GPS-based roadside assistance and navigation system.

The *SMART*, which went on sale in October 1998, is being marketed aggressively as a new "mobility concept." *SMART* owners will have special facilities to rent a *SMART* car at airports and railroad stations when traveling. Other privileges of *SMART* ownership may include specially reserved parking spaces in German city centers and *SMART* shared-car cooperatives for occasional auto users. (*see also, 1.4.2)*

5/99

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.7.3

CONCEPT: City Car

PROJECT NAME: The *Smart* (Update)

LOCATION:

Mercedes-Benz's tiny *Smart* car, launched a little more than a year ago (see 1.7.1) is gaining in popularity among European city dwellers. DaimlerChrysler has recently been selling as many as 10,000 *Smart* cars a month, up from about 3,000 a year ago. In fact, the car is proving itself so popular that Mercedes-Benz has decided to expand its marketing efforts beyond the nine European countries where it was first launched. The company will start selling the *Smart* in the United Kingdom and Japan and is planning to enter new markets as distant as Taiwan and Thailand. But the *Smart* is not expected to come to the United States because it is considered far too small for the tastes of American consumers.

What accounts for the *Smart's* growing appeal in the rest of the world? A combination of convenience and "reverse snob appeal," according to European market analysts. The car is so small that it can be parked perpendicular to the curb. That's a real advantage in the crowded cities of Europe and Asia, where downtown parking space is at a premium. Although the vehicle only weighs 720 kg (1,590 lbs), its rigid unit construction and air bags make it as safe as a conventional car, according to its manufacturer. At the same time, the *Smart* consumes only 4.8 liters/100 km (51.6 mpg), making it the most economical and environmentally-friendly car on the market. And, despite its small size, the *Smart* has all the usual creature comforts. It can be equipped with a mobile phone and a GPS-based roadside assistance and navigation system, and will soon be available in a convertible version.

But the *Smart's* appeal goes beyond its utilitarian value. There is a new generation of affluent young urban professionals in Europe and Asia who want a small fuel-efficient car to get around town, but also desire style, fun and a good driving experience. The *Smart* seems to possess these attributes.

Source: Innovation Briefs, May/June 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.8.3

CONCEPT: Underground Roadways

PROJECT NAME:

LOCATION: San Francisco, California, USA

The latest draft long range transport plan for San Francisco proposes feasibility studies of three underground city toll roads to take heavy traffic off surface streets and manage it more efficiently sub-surface. One of the proposals is a 3-km underground roadway under Van Ness Avenue which carries heavy local traffic around the western fringe of the downtown business district. It is also a major route between the freeways on the west Bay Peninsula and the Golden Gate Bridge with its link to Marin and Sonoma counties. A second underground roadway would be an 8km stretch connecting I-280 near Daly City to the southern approaches to the Golden Gate Bridge.

The underground facilities would be funded by tolls, using electronic toll collection technology. Charges would vary dynamically to prevent congestion. The underground roadways would be built and operated by private companies under franchise to the city. According to the draft plan, the major rationale for the three tunnel supercorridors is to improve neighborhood livability by removing surface traffic and to help speed Muni bus and trolley service on the surface with dedicated lanes. The report envisages the tunnelways as allowing the widening of sidewalks, and more resident curbside parking. The report says it expects the proposal to be "controversial" but says San Francisco "must consider new ideas for solving transportation problems,"

The draft plan notes that similar projects are under way in Paris, Singapore and Norway. Sydney, Melbourne, Tokyo, Stockholm, Berlin, Lyons and Madrid also have somewhat similar projects. The proposal has generated strong interest in San Francisco and opinion for and against.

Source: Toll Roads Newsletter, April 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.8.4

CONCEPT: Underground Roadways

PROJECT NAME: *Metroroute A-26* (Update)

LOCATION: Paris Region, France

Halted by legal problems for over a year, Paris' revolutionary underground road network is back on track (see, 1.8.1). According to officials of *Cofiroute*, the French construction and tollroad operator that is the project's sponsor, all substantial issues have been resolved and construction of the project, a missing link in the outer ring autoroute crossing the Versaille area of the Paris region (A-26), began in January 2000. Efforts to build this leg of the autoroute on the surface had earlier run into overwhelming opposition because of the historic character and picturesque nature of the area around Versaille.

The tunnel, only 10 meters (33 feet) in diameter, will be built in two sections. The first section will be a 10 km long tunnel with a two-level roadway, each three lanes wide. The second section will be 7.5 km (4.6 mile) long, with only one lane in each direction. The 10-km tunnel will accommodate passenger vehicles only – estimated to constitute about 80-90 percent of the traffic flow in the A-26 corridor. By segregating passenger vehicles, engineers will be able to provide for steeper ramps and tighter turns. The shorter section will be open to trucks as well as passenger cars. Variable tolls will be used to maximize revenues and to prevent overloading of the facility. Average tolls will be $4 for the full distance trip.

Opening of the first section scheduled for early 2005.

Source: Toll Roads Newsletter, October 1999

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.9.2

CONCEPT: Advanced Propulsion Technologies

PROJECT NAME: "The Supercar"

LOCATION: United States

Alternative propulsion technologies for cars began to get serious attention just ten years ago, as auto makers came under pressure from environmental regulators, particularly in California, to develop low- or zero-emission vehicles (ZEV). In 1990, California mandated that by 2003, fully 10 percent of cars sold in the state must be essentially pollution-free. One obvious answer was to build battery-powered electric cars. General Motors led the way, launching its EV-1 model in December 1996. But EV-1 flopped with consumers. Not only could the vehicle travel only 80 miles before running out of power, it also cost more than $30,000 and had to be leased because there was no viable resale market for it. Honda's electric vehicle fared no better. While several automakers still soldier on with electric vehicle, none foresee a sales breakthrough.

Meanwhile, important strides have been made in improving the performance of fuel cells, which produce electricity through an electro-chemical reaction of hydrogen and oxygen drawn from the air. In 1968 General Motors unveiled a prototype fuel cell van but, like early battery-powered electric cars, the fuel cell power plant occupied most of the vehicle's cargo space. During the next several years, however, engineers succeeded in significantly reducing the size of fuel cells. In May 1996, Daimler-Benz was able to roll out a fuel cell-powered van seating six people, followed by Toyota and General Motors, which unveiled fuel cell powered versions of their sport-utility vehicle and Opel minivan respectively. A turning point of sorts occurred in 1997, when both Daimler Benz and Toyota introduced prototype fuel cell vehicles that employed methanol rather than pure hydrogen. Methanol has several advantages over pure hydrogen: it is readily available, it is not highly combustible, it can be stored in existing underground gas station tanks and dispensed with only minimal equipment changes, and it does not require big on-board storage tanks. Methanol fuel cells also have a pronounced advantage over electric batteries: while the latest battery-powered cars can travel only about 150 miles between recharges, a fuel-cell powered car can go 250-300 miles on a tank of methanol. Buoyed by this performance, the methanol industry, which sees fuel-cell cars as a potentially huge new market, has been working actively with auto companies on the logistics of distributing large quantities of methanol to filling stations around the world.

Mass-produced fuel cell-powered cars will be available early in the next decade, according to industry announcements. DaimlerChrysler expects to come out with a fuel-cell powered version of its Mercedes A-class model in 1999 and plans to start selling fuel cell-powered cars by 2004. Other car makers announcing plans for fuel cell-powered cars include Ford (which has joined forces with DaimlerChrysler to develop and commercialize fuel cell power trains and to market them to the motor vehicle industry), General Motors, Toyota, Honda, and BMW.

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **POLICIES AFFECTING AUTOMOBILE USE** NO. 1.9.3

CONCEPT: Advanced Propulsion Technologies

PROJECT NAME: Hybrid Cars

LOCATION:

The US program to create a non-polluting, fuel-conserving "super car"car for the new century is finally showing some signs of progress. At the North American International Auto Show in Detroit in March 2000, prototype hybrid-electric cars were very much on display. They are the product of the government-industry effort, announced in 1993, the so-called Partnership for a New Generation of Vehicles (PNGV), whose aim is to develop by 2004 a ready-to-build prototype of a mid-size car that gets up to 80 miles per gallon and whose safety, performance, range and price are comparable to a traditional family sedan. Hybrids could represent 20 percent of the market in ten years, says Ford's Chairman, William Clay Ford, Jr.

But while the Big Three are working on prototypes, Japanese automakers are rolling out production models. Toyota's 55 mpg *Prius* hybrid electric, for example, has been on the market in Japan since December 1997, and will go on sale in the United States in the summer 2000. Honda's entry, *Insight*, a two-seat hybrid that uses an auxiliary electric motor to achieve a fuel economy rating of 76 miles per gallon, went on sale in the United States in December 1999. Both cars operate on electricity at low speeds and switch automatically to the gasoline engine at higher speeds, depending on driving conditions. Because the gasoline engine and regenerative brakes recharge the battery, the *Prius* never has to be plugged in for recharging. While the *Prius* boasts significantly lower emissions — up to 50 percent reduction in carbon dioxide and 90 percent in CO, hydrocarbons and nitrogen oxide — it does not qualify as a Zero Emission Vehicle (ZEV) under current California regulations, as would an entirely electric car. Still, the *Prius*, along with Honda's entry *Insight*, represents a great leap forward in the efforts to develop an environmentally-friendly car.

Source: Innovation Briefs, Sept/Oct 1999; March/April 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **TRANSPORTATION DEMAND MANAGEMENT** NO. 2.0.1

CONCEPT: Transportation Pricing Strategies – Overview

PROJECT NAME:

LOCATION:

Pricing of transportation facilities is being applied in a growing number of cases throughout the world, both as a revenue generating measure and as a demand management strategy. Pricing is being used to charge for the use of a variety of transportation facilities such as limited access highways, individual freeway lanes, bridges, tunnels and even arterials and city streets.

A variety of pricing strategies have been implemented or are being proposed. They include (numbers in brackets refer to fact sheets): (1) **fixed tolls** (bridges, tunnels); (2) **distance-based tolls** (most toll roads); (3) **variable tolls** that vary by time-of-day or day-of-week according to a fixed schedule, often intended as a means of shifting demand to off-peak periods (Autoroute du Nord and Autoroute Paris-Troyes, France [2.2.1], SR-91, Orange County CA [2.3.2], Dulles Greenway [6.1.6], LeeWay, Florida [2.2.3], Highway 407, Toronto [3.6.3]); (4) **dynamic pricing –** tolls that are allowed to fluctuate from minute to minute (within a pre-determined range) in response to changing congestion levels (I-15, San Diego CA [2.2.2]); (5) **HOT (High Occupancy Toll) lanes** – HOV facilities which are open to solo drivers for a fee (which may or may not vary dynamically) [2.2.2]; (6) **Congestion Pricing –** fees imposed upon vehicles entering a designated congested area such as a central business district, usually intended as a means of restricting access to the area or shifting demand to off-peak periods (Singapore [2.1.2, 2.1.7], Oslo, Bergen, Trondheim [2.1.4], *Rekeningrijden*, The Netherlands [2.1.10], Rome [1.1.9], Tokyo (proposed) [1.1.10]).

Pricing of transportation facilities is seen by many transportation policy makers and local authorities not only as an efficient and equitable revenue generator to pay for transportation facilities, but also as a means of maintaining congestion-free facilities that offer a premium level of service. The use of pricing with that purpose in mind may be expected to grow as congestion levels increase.

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **TRANSPORTATION DEMAND MANAGEMENT** NO. 2.1.10

CONCEPT: Congestion pricing

PROJECT NAME: *Rekeningrijden*

LOCATION: Amsterdam

A proposal for a cordon pricing scheme to control traffic congestion in the entire Randstaad region of the Netherlands has now survived in a modified form. Originally, the scheme would have established morning peak period tolls on all major highways leading into Amsterdam, Rotterdam, Utrecht and The Hague (see 2.1.9). That proposal, fiercely opposed by the Dutch Automobile Association, was shelved and has been replaced by a compromise that limits the pilot scheme to just one city – Amsterdam.

The scheme involves the setting of a morning peak period toll on all major motorways leading into the city of Amsterdam – the A-2 from the southeast, the A-4 from the southwest, and the A-1 from the east. All toll collection will be done electronically. Motorists utilizing transponder-based smart cards will be charged $2.25. Those who do not employ smart cards will be charged $3.15 and billed by mail through a license plate recognition system. The license plate imaging system will involve photographing both the front and the rear of the vehicle in order to reduce the possibility of an error. An error rate of less than 0.5% has been demonstrated in field trials.

In September 1999, following evaluation of test results, two finalists were chosen from among four competing consortia for final development of the system. In mid-2000 one of the two remaining consortia will be chosen to implement the scheme, which should become operational at the end of 2001. *Rekeningrijden* will undergo a two-year evaluation before a final decision is made whether to introduce the scheme throughout the Ranstaad on a permanent basis.

Source: Toll Roads Newsletter, January 2000; Traffic Technology International, April/May 2000.

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **TRANSPORTATION DEMAND MANAGEMENT** NO.2.2.1 Rev

CONCEPT: Variable Tolls

PROJECT NAME: Autoroute du Nord (a-1); Autoroute Paris-Troyes (A-5)

LOCATION: Paris Region, France

Autoroute du Nord (A-1)

Variable toll pricing has been in effect on the Autoroute du Nord (A 1) since 1992. Sunday tolls on the Autoroute du Nord (A-1), which connects Paris with Lille and points north, are raised 25 percent between 4:30 pm and 6:30 pm and lowered 25% for two hours immediately preceding and following the peak period. The large differential (26 francs or $5) is intended to encourage returning weekend travelers to shift to the shoulder periods. Traffic has been cut by 5 percent during the peak period, according to French officials, and no diversion to free parallel highways has occurred. The pricing scheme, which has met with public acceptance and has produced significant shifts in demand among weekenders returning to Paris on Sunday night, has convinced French autoroute operators that it is an effective instrument of seasonal and intercity travel demand management and should be applied widely throughout the French autoroute network.

Autoroute Paris-Troyes (A-5)

Autoroute access to Paris from the south is now offered through two roughly parallel routes. In order to balance traffic flows on the two access roads, especially during periods of heavy weekend and holiday travel, the autoroutes' operator, Societé des Autoroutes Paris-Rhin-Rhône (S.A.P.R.R.), has instituted a system of surcharges and discounts on its newest Paris-Troyes autoroute (A 5). Motorists pay only 65 percent of the normal toll during periods of no congestion, and 85 percent of the normal toll during periods of moderate congestion. During peak congestion, they have to pay an extra 25 percent surcharge.

Ref: Toll Roads Newsletter, October '96; November'97

Rev. 5/99

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **TRANSPORTATION DEMAND MANAGEMENT** NO.2.2.1 Rev

CONCEPT: Variable Tolls

PROJECT NAME: Autoroute du Nord (a-1); Autoroute Paris-Troyes (A-5)

LOCATION: Paris Region, France

Autoroute du Nord (A-1)

Variable toll pricing has been in effect on the Autoroute du Nord (A 1) since 1992. Sunday tolls on the Autoroute du Nord (A-1), which connects Paris with Lille and points north, are raised 25 percent between 4:30 pm and 6:30 pm and lowered 25% for two hours immediately preceding and following the peak period. The large differential (26 francs or $5) is intended to encourage returning weekend travelers to shift to the shoulder periods. Traffic has been cut by 5 percent during the peak period, according to French officials, and no diversion to free parallel highways has occurred. The pricing scheme, which has met with public acceptance and has produced significant shifts in demand among weekenders returning to Paris on Sunday night, has convinced French autoroute operators that it is an effective instrument of seasonal and intercity travel demand management and should be applied widely throughout the French autoroute network.

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Ref: Toll Roads Newsletter, October '96; November'97

Rev. 5/99

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **TRANSPORTATION DEMAND MANAGEMENT** NO. 2.8.1 Rev

CONCEPT: Ridesharing

PROJECT NAME: Interactive On-Line Ridematching

LOCATION:

Internal computer systems designed to facilitate employee ridesharing enable employees to do their own carpool matching using computer bulletin boards accessible through desktop computers or through touchscreen kiosks located in company cafeterias and public lobbies. Employees can enter their names, telephone numbers and carpool preferences into the database, confident that this personal information will only be shared with fellow employees. This overcomes one of the drawbacks of regional ridematching systems — people's reluctance to provide personal data to public data banks and to enter into ridesharing arrangements with strangers.

On-line ridematching has been embraced by a growing number of companies and Transportation Management Associations (see 8.2.1) as a byproduct of the expanding use of corporate e-mail systems and computer networks (LAN). One attractive feature of these systems is their versatility. Interested employees can sign up for full-time participation or just for an occasional ride.

One of the largest private ridematching systems of its kind is the University of Washington's SWIFT Smart Traveler (SST) system. The University is Seattle's largest employer, with some 50,000 faculty, staff and students. Most of them commute to and from the campus on a daily basis. The SST will involve an array of communication technologies, including e-mail, computer bulletin boards, touchscreen kiosks and telephones.

See also 8.2.1, Transportation Management Associations

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **TRANSPORTATION DEMAND MANAGEMENT** NO. 2.10.2

CONCEPT: Parking Management

PROJECT NAME: Modular Automated Parking System (MAPS)

LOCATION: Hoboken, New Jersey, USA

A fully automated parking facility that handles cars with no human intervention has opened in Hoboken, New Jersey in April 2000. Built for the Hoboken Parking Authority by Robotic Parking, Inc., the Modular Automated Parking System (MAPS) is designed to make optimum use of available sites in congested central business districts where space is at a premium and land values are high. MAPS is said to provide twice as many parking spaces as would be available in a similarly sized ramp-style parking garage. Or, it uses only half of the area normally needed for the same number of cars.

Motorists drive into one of four street level bays and onto a pallet. The driver leaves the car and activates the system by pushing a button. The system delivers a coded ticket and the car on its pallet is transported automatically by means of vertical lifts and horizontal rails to a vacant slot within the garage. On returning to the garage, the motorist goes into a reception lobby and presents his coded receipt to an attendant. Upon payment, the motorist is directed to one of the four bays to which the car is returned, normally within 60 to 90 seconds. The car is never driven once inside the facility, and the driver never sets foot inside the garage, reducing the risk of personal injury. The system can handle 18 mechanical movements simultaneously – whether up or down, turning, and back or forth – so multiple cars can be handled at once.

Robotic Parking, which holds a patent on the MAPS system, is currently negotiating construction of a further seven automated parking facilities with capacities of 600-1500 cars.

Source: The Wall Street Journal, Feb. 3, 1999; ITS International, March/April 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **TRANSPORTATION DEMAND MANAGEMENT** NO. 2.12.1

CONCEPT: Incentives to Reduce Driving

PROJECT NAME: Pay-As-You-Go Auto Insurance

LOCATION: Houston

Progressive County Mutual, one of the largest auto insurers in the United States, has begun a limited marketing test in Houston of a new approach to auto insurance pricing that bases insurance premiums on actual vehicle usage. Although some insurance companies have been using vehicle mileage in their calculation of insurance rates, this is the first time that the rates will be based on actual data as to when and how much a vehicle is driven. Progressive's product, called Autograph, is a device the size of a videocasette, that records vehicle mileage and reports it automatically to the insurer using wireless data transmission technology. According to Willy Graves, Progressive's president, "autograph works like a monthly utility or telephone bill, with the consumer paying by the month, based on actual usage rather than on the user's estimates or on historical data derived from groups of similar people and vehicles. It's simple, really. If you drive less, you pay less."

This is the first instance of a "distance-based fee" that certain economists and environmentalists have been advocating as an incentive to reduce driving. Skeptics point out, however, that driving is singularly price-insensitive, and that small savings in insurance premium would have negligible effect on total VMTs.

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS** NO. 3.1.14 Rev

CONCEPT: Systemwide ITS Deployment

PROJECT NAME: "5T" (*Telematic Technologies for Traffic and Transport in Turin)*

LOCATION: Turin, Italy

An integrated intermodal transportation management system, employing state-of-the-art communication and information technology has been deployed in Turin since 1996. The system includes signal control at 140 instrumented intersections, variable message signs, eight smart-card equipped parking garages with electronic parking guidance, a traveler information system consisting of video kiosks and route guidance, vehicle emission monitoring stations and a signal priority system for ambulances. The 5T system also assists in the management of Turin's 1350-vehicle urban bus and tram fleet, using automatic vehicle identification (AVI) technology, dynamic passenger information displays at 200 transit stops, and INFOBUS pagers (see 4.2.4)

The 5T system is a joint undertaking of the municipality of Turin, FIAT, the local transit operator, the electric power company, and several electronics firms. Daily travel in Turin is approximately two million trips, of which 65 percent are by private car and 35 percent are by public transport.

An evaluation of the 5T system performance by *Centro Studi sui Sistemi di Transporto,* has disclosed some significant results. Installation of the urban traffic control system alone has resulted in a 17 percent reduction of travel time by motor vehicle and a 13 percent reduction in travel time by public transport within the 5T study area. There also has been a 3 percent modal shift from personal cars to public transit. It is estimated that when the Integrated 5T system is fully deployed, auto travel time will decrease by 24 percent and travel time by public transport will decrease by 19 percent, with overall travel time in the study area reduced by 21 percent..

Note: for a related transport innovation in the city of Turin, see, 1.3.7, *Elettra Park*

Source: Dr. Mario Carrara, Director General, Centro Studi sui Sistemi di Transporto, Torino, Italy,

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INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS (ITS)** NO. 3.1.15

CONCEPT: Systemwide ITS Deployment

PROJECT NAME: Cell Phones as Traffic Probes

LOCATION: Oakland CA and Washington DC

The mandate by the Federal Communication Commission that wireless phone companies be able to locate callers when they call the emergency 911 number, has given a big boost to the application of cell phones as traffic probes. Using GPS technology, it is now possible to monitor the location, speed and direction of vehicles equipped with cell phones. By tracking the data points gathered from individual cars on the road, traffic management centers and information providers can obtain an accurate real-time depiction of traffic flow even in places that are not equipped with road sensors or video cameras. This capability has significance for vast areas of the road network. Today, only 7 to 12 percent of U.S. urban freeway miles are instrumented, and this coverage is expected to increase to no more than 15-20 percent by 2020, according to recent estimates. Consequently, the ability to monitor traffic without loop detectors and closed circuit TV cameras can dramatically extend public and private travel information capabilities. Using cars as traffic probes, information providers can detect disturbances in the flow of traffic and spot trouble spots with precision. These can then be assigned specific latitude and longitude coordinates which, along with location codes, allow traffic hot spots to be precisely displayed on in-vehicle digital map displays.

Among the technologies being developed for the E-911 mandate are GPS-based triangulation and RadioCamera ™, a proprietary system of US Wireless Corp. The latter employs a patterns recognition technique to determine the location of cell phones in use. Each location is characterized by a unique multipath RF signal signature determined by the special configuration of buildings, topography, and other physical features. RadioCamera's system of antennas picks up the signals of operating cell phones and matches them with the signal signatures in its data base to identify the unique location of each cell phone. By tracking the movement of individual cell phones and continuously updating their location, it can estimate traffic speed. Speeds of individual cell phones are averaged to obtain average speed of traffic flow for various segments of roadway. The patented technology is the signal processing software plus the "reference library" of multipath RF signatures that identify different locations.

Field trials are underway in Northern Virginia. US Wireless' plans call for deployment of RadioCamera networks covering the top one hundred metro areas, to become operational by 2002.

Source: Traffic Technology International, Jan/Feb 2000; Toll Roads Newsletter, January 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS (ITS)** NO. 3.1.16

CONCEPT: Systemwide ITS Deployment

PROJECT NAME: ROMANSE II

LOCATION: Southampton, United Kingdom

ROMANSE II builds on the wealth of experience gained during the ROMANSE program, 1992-95 (see, 3.1.4). The initial program, designed to demonstrate a coordinated use of various ITS technologies to relieve urban traffic congestion, included an adaptive traffic control system, a Travel Information Center, a real-time bus arrival information system at bus stops (STOPWATCH), bus priority at traffic signals (PROMPT), variable message signs and kiosk-based computer terminals to provide up-to-date trip planning information in and around Southampton (TRIPlanner).

ROMANSE II is focused on enhancements in the traveler information system using route guidance variable message signs and onboard information displays in buses; a "gating" system using smartcard technology to control traffic flows in and out of the congested port area; and an incident management strategy.

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS (ITS)** NO. 3.1.17

CONCEPT: Systemwide ITS Deployment

PROJECT NAME: TRANSMIT (Toll Tags for Traffic Monitoring)

LOCATION: New York-New Jersey, USA; Sao Paulo, Brazil

For a traffic management system covering a very large metropolitan area, surveillance by video cameras is not practical. Cameras can be useful in confirming incidents and deciding what action to take, but cameras cannot detect slight disturbances in the traffic flow, nor can they automatically alert traffic controllers of trouble on the highway. For this, a more sensitive surveillance system is required. Such a system is operating on an experimental basis in New York and New Jersey (TRANSMIT). The system employs roadside RF readers that detect on-board toll tags or transponders carried by a growing number of cars in regions where there are toll roads. The readers are placed at regular intervals along the road network. The signals gathered by the roadside detectors from individual cars are sent to a central computer. By matching the upstream and downstream signals emanating from the same source, incident management centers can detect disturbances in the flow of traffic and spot trouble spots with precision. The TRANSMIT system maintains privacy by assigning random numbers to the toll tags. Thus, individual vehicles can be tracked, but the identity of the vehicle is not known to the traffic management agency.

The same type of system is currently being implemented in Sao Paulo, Brazil.

Source: Tolltrans, 1999

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS (ITS)** NO. 3.1.18

CONCEPT: Systemwide ITS Deployment

PROJECT NAME: MOVE GmbH

LOCATION: Hannover, Germany

The City of Hannover broke new ground by becoming the first city in Germany (if not in the world) where the responsibility for all traffic/incident management and traveler information has been turned over from the public authorities to a private company, MOVE GmbH. The occasion was Hannover's EXPO 2000, Germany's first world's fair, which is being inaugurated in June 2000. EXPO 2000 is expected to attract over 400,000 visitors during peak days, almost doubling the resident population.

MOVE GmbH was originally formed in 1996 to deploy and operate an elaborate intelligent traffic management system capable of handling the huge influx of visitors expected in connection with EXPO 2000. The company has established a Traffic Information Center (TIC) and a Traffic Control Center (TCC). The former provides real-time information on traffic conditions and alerts motorists about traffic bottlenecks and weather conditions via RDS-TMC (Radio Data System-Traffic Message Channel). The TIC also offers destination and alternate route guidance through in-vehicle displays. The TCC monitors traffic flow and incidents with the help of loop detectors, infrared sensors and video monitors set up from up to 120 km away. Based on the data, the TCC evaluates the state of traffic in and around Hannover, and coordinates traffic management, transit operations and incident response, working with local police, emergency services and transit operators. An elaborate areawide real-time parking information and guidance system using variable message signs guides visitors to empty park-and-ride lots on the periphery of the city, as well as to parking facilities inside the EXPO grounds.

MOVE GmbH represents the first time anywhere, where a private company has assumed primary responsibility for coordinating transportation management in connection with a large-scale special event. Even more significantly, when the EXPO is over, MOVE GmbH will assume this responsibility on a permanent basis. In so doing, the City of Mannheim hopes to become an international showcase for a public-private partnership in coordinated regional mobility management

Source: Traffic Technology International, 2000; Traffic Technology International, April/May 1999

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS** NO. 3.2.1 Rev

CONCEPT: Traffic/Incident Management Systems

PROJECT NAME: *Drive Time*

LOCATION: Melbourne, Australia

Since 1989 Melbourne's freeways have been equipped with an electronic congestion and incident detection system (ACIDS) utilizing detection loops at approximately 500 meter intervals. The loops send signals every 20 seconds to a traffic control center indicating speed, volume and lane occupancy data. Should the rate of change be significant over several consecutive intervals, an alarm is sounded in the traffic control center. Once the central computer raises an incident alarm, operators view the incident by video surveillance and take appropriate action to inform the motorists of the congestion ahead and dispatch an incident-clearing team.

Drive Time, an extension of the incident detection system, utilizes the same detection loops to calculate travel time for each 500-meter section of the road. Times in adjacent segments are totalled and converted to times between freeway exits. The information is presented on electronic variable message boards, showing estimated travel times from the sign location to various freeway exits. A color-coded strip shows traffic conditions on segments between each major exit. Other variable message signs at freeway entry ramps alert drivers of traffic conditions on the freeway, giving them an opportunity not to enter the freeway (or exit the freeway) if conditions ahead are "red."

Information about travel times between specific freeway exits, and about incidents is also made available over the telephone.

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS** NO. 3.2.2

CONCEPT: Traffic/Incident Management Systems

PROJECT NAME: Remote Weather Information System (RWIS)

LOCATION: New Jersey Turnpike, USA

A Remote Weather Information System (RWIS) is being deployed along the entire 240 km length of the New Jersey Turnpike. The system will be the largest installation of its kind in the nation. The main reason for the Turnpike Authority's decision to install the system has been accident reduction. About 30 percent of all traffic accidents on the Turnpike are weather-related

The system will monitor three key elements: changes in the weather (wind speed and direction, relative humidity, barometric pressure, and precipitation), visibility problems, and road surface conditions. Data will be received from 30 monitoring stations spread strategically along the turnpike. Each station will have its own remote processing unit, which will receive and process real-time weather data and transmit it to the turnpike's traffic operations center in East Brunswick. Cellular digital packet data (CDPD) will be employed as the communication technology. The monitoring stations will be programmed to report on a five or ten-minute cycle during periods of high volume traffic. The frequency of reporting will be decreased during periods of low traffic and increased during periods of severe weather. The extensive instrumentation will allow highly localized information of potential weather related hazards, such as pockets of fog and ice (a leading cause of chain accidents).

The Turnpike authority will be able to communicate real-time weather information directly to motorists via electronic variable message signs, emergency speed warning signs and its highway advisory radio (HAR). Relevant data will also be transmitted automatically to the Authority's district maintenance offices to speed up deployment of snow-clearing and road de-icing.

Sophisticated weather warning systems are increasingly being incorporated as elements of advanced traffic/incident management systems.

Source: ITS International, March/April 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS (ITS)** NO. 3.2.3

CONCEPT: Traffic/Incident Management Systems

PROJECT NAME: FAST

LOCATION: Las Vegas Nevada, USA

Institutional barriers often represent some of the most difficult obstacles to getting a regional traffic management system successfully implemented. These barriers have been overcome in Las Vegas' new multi-jurisdictional, traffic and incident management partnership called FAST, which involves the Nevada Department of Transportation, county and city agencies, law enforcement and an inter-jurisdictional management committee. FAST will consolidate the county/city-operated regional Arterial Management System and a new state-deployed Freeway Management System that will provide all local freeways with surveillance, detection, ramp metering, variable message signs and highway advisory radio. A Regional Traveler Information System with data archiving capability will replace the currently fragmented traffic and transit information sources.

In 2002 when FAST is established organizationally and becomes fully operational, it will collect annual operations and maintenance fees from the participating state, county and local organizations using a formula based on the number of traffic signals located in each member jurisdiction. A refined formula, to be adopted in 2005, will take into account other field devices, such as variable message signs, CCTV video cameras, HAR transmitters and ramp meters.

Source: Traffic Technology International 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS** NO. 3.3.5 Rev

CONCEPT: Traveler Information Systems

PROJECT NAME: Traveler Information Kiosks

LOCATION: State of Georgia, USA

The project involved deployment of over 160 traveler information kiosks in Atlanta and across the state of Georgia, in time for the 1996 Summer Olympic Games. The kiosks, which have been retained after the Olympics, provide information to aid both daily commuters in the metro Atlanta area and visitors throughout the state. Travelers are able to access traffic conditions, public transit schedules, airport schedules and tourist services information through the kiosks' touch screen interface. Real time traffic conditions are displayed on a color-coded map of the Atlanta region. Travelers are able to choose from a list of origins and destinations or enter specific addresses for routing. Real time traffic conditions are taken into account when calculating the best route.

Public transit information, including schedules and itinerary planning, is available through an interface with the Metropolitan Atlanta Rapid Transit Authority (MARTA). Information about ridesharing, vanpooling and park-and-ride options is part of the kiosk program through the Atlanta Regional Commission's Commute Connections program. The kiosk information menu also includes current weather forecasts (available as text or in graphics form), airline arrival and departure schedules for Atlanta Hartsfield Airport, and tourist attractions, lodging information and a hotel reservations system. Every kiosk is equipped with a touch screen interface, an on-screen keyboard and a laser printer, all enclosed in a free-standing structure. Kiosks are located both indoors and outdoors, at public and private sites. The entire kiosk system is maintained by GeorgiaNet, an authority charged with marketing and selling electronic access to public information to public and private customers.

Note: Traveler information kiosks exist in numerous other locations in North America, Europe and Asia. The State of Georgia was the first large-scale application of this device in the United States.

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS** NO. 3.4.1 Rev

CONCEPT: Parking Guidance and Information (PGI) Systems

PROJECT NAME:

LOCATION: Various cities in Europe

The objective of advanced parking management systems is to provide motorists with accurate, continuously updated information about the occupancy status of parking facilities, so as to allow motorists to select in advance the most convenient parking location. Parking guidance systems may be used to facilitate access to parking garages in central business districts, surface parking lots on the periphery of downtown areas, park-and-ride lots serving suburban commuter rail stations, satellite parking lots at airports, and parking areas surrounding sports and entertainment complexes.

Parking management systems can function at two levels: areawide space availability and facility-specific space availability. At areawide level, PGI systems monitor space availability in all parking facilities within a city. Typically, on approaching their destination (a city center, an airport, a sports arena, etc) motorists encounter a tier of variable message signs showing a continuously updated inventory of available parking spaces at each individual parking facility. The architecture of PGI systems is fairly straightforward. Individual parking facilities are equipped with "add-and-subtract" loop detectors, which record the exact number of spaces left vacant. This data is transmitted to a central computer, which interprets and displays the information on variable message signs erected at strategic locations on approaches to the area. Areawide PGI systems are designed to spare motorists the inconvenience, loss of time and frustration of a search for a parking facility that can still accommodate cars. They also help to reduce congestion, since up to 30 percent of traffic in city centers is said to be caused by motorists searching for parking spaces.

At the facility-specific level, PGI systems eliminate the need for drivers to blindly drive through fully occupied rows of parked cars in search of a vacant stall. Motorists arriving at a parking facility, typically a multi-level parking garage, are directed by means of variable message signs to parking zones or levels within the garage that are still unoccupied. Within each zone they are able to locate free places with the help of overhead lights (green for unoccupied, red for occupied stalls). This requires more elaborate instrumentation using vehicle sensors that detect the presence/absence of a vehicle in each individual stall, but the cost of the installation may be more than offset by increased productivity and increase revenue yield per parking space.

Electronic parking guidance and information systems are functioning in many European cities, where severe congestion and shortage of space in city centers have provided a strong incentive for their deployment.

Ref: Innovation Briefs, December '95, ITS International, March/April 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS (ITS)** NO. 3.8.8

CONCEPT: Telematics

PROJECT NAME: Tegaron

LOCATION: Germany

In three to five years, every new car sold in Germany is expected to be equipped with a system for mobile communications and global positioning, providing a full range of in-vehicle telematics services. Anticipating this fast-growing market, a private German firm, Tegaron, is introducing a range of different services, including traffic information (*Tegaron Traffic* and *Tegaron Info),* dynamic navigation (*Tegaron Scout)* and emergency roadside services (*Tegaron Help).*

Tegaron Info allows drivers to obtain personalized real-time information about traffic conditions on intercity autobahns across Germany by dialing a unique countrywide number, 2211 using mobile phones. Last year over two million drivers availed themselves of this service at a cost of 25 cents per call. The traffic data is generated by a proprietary system of 4,000 infrared sensors along the 8,000 km of German autobahns.

Tegaron Traffic offers rapid emergency and breakdown service. Monthly subscription fee for this service is approximately $23. As an additional feature, *Tegaron Traffic* provides individualized route guidance service. This service, similar to the Hertz *NeverLost* service, guides the driver to his destination using a scrolling map in an installed unit underneath the dashboard. *Tegaron Help*'s fully automatic emergency call system called TeleAID, has been available on Mercedes-Benz cars since 1998.

Tegaron Scout is Tegaron's latest and most sophisticated service. It offers dynamic navigation assistance based on real time data about traffic and road conditions. In the event of a major accident or serious delays due to road reconstruction, *Tegaron Scout* will come up with an alternative route and guide the motorist to his destination.

Source: Traffic Technology International, June/July 1999; Company information

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS (ITS)** NO. 3.8.9

CONCEPT: Telematics

PROJECT NAME: Satellite Radio

LOCATION:

A new communications technology is making a serious bid for the attention of the motoring public. XM Satellite Radio and Sirius Satellite Radio, two upstart companies, are developing digital satellite-based mobile radio systems, a technology that promises to do for the car radio what cable television did for home TV (see 3.8.5). Satellite radio will have up to 100 channels of commercial-free music, news, sports and entertainment and will be made available by subscription to motorists at a monthly fee of $10. Vehicle-based satellite radio receivers will be available as a factory-installed option as early as the 2001 model year. In contrast to the regional reach of traditional AM and FM radio stations, satellite radio will provide nationwide coverage, a great convenience to long distance travelers who will be able to listen to their favorite channel without searching the dial as they travel through unfamiliar parts of the country.

The two radio satellite companies have already signed up a number of auto companies. XM Satellite has entered into an exclusive arrangement with General Motors, while Sirius has negotiated agreements with Ford Motor Co., DaimlerChrysler, BMW, Jaguar, Mazda and Volvo. Sirius expects to begin brodcasting nationally at the end of this year, while XM Radio will launch its service early in 2001. Market analysts estimate that 30 million vehicles will have satellite radio receivers by 2008, creating a $5 billion a year business. Just as cable, twenty years ago, brought additional value to television by offering clearer reception and more programing choice, satellite transmissions will enhance enormously the value of the car radio.

Satellite radio will not be confined just to audio entertainment. Sirius and XM Radio also intend to give consumers the ability to make purchases directly from their cars. With the touch of a button on their radios, car occupants will be able to order records, books and other goods and services promoted on the programs of the satellite radio. What makes these interactive transactions possible is a wireless "back channel" that will allow motorists to send as well as receive data. Sirius has entered into an agreement with ATX Technologies to use the latter's wireless communication capability for a two-way link with its subscribers. OnStar will provide a similar back-channel function to XM Radio.

Source: Innovation Briefs, May/June 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS (ITS)** NO. 3.8.10

CONCEPT: Telematics

PROJECT NAME: Traffic*master* (see also 3.3.13)

LOCATION: United Kingdom

The British private traveler information system, known as Traffic*master*, first introduced in 1988, has reached a degree of maturity and sophistication unequaled anywhere else in the world. Its thousands of sensors, installed approximately at two-mile intervals, constantly monitor traffic flow over 7,5000 miles of Britain's roads and report this information to Traffic*master's* National Data Center. The company offers a wide spectrum of telematics services which are available on all British motorways and 95% of trunk roads (main highways):

- A national network of local radio transmitters provides live traffic reports using digital messages over UHF. The transmitters are located strategically on motorways. Each transmitter broadcasts information covering ten miles ahead. Once a motorist is within range of a transmitter the in-car receiver decodes the information and delivers the messages via voice and visual displays.
- Traffic*master's* joint venture with the broadcast industry provides travel news bulletins to the leading commercial radio stations throughout the U.K.
- Traffic*master's* Traffic Alert system helps drivers steer clear of traffic congestion by alerting them to incidents and slow-moving traffic up to 15 miles ahead. The alert unit is backed up by wireless telephone service that uses the customer's location to deliver a live automatic voice traffic report.
- Traffic*master's* speech-based *Oracle* system interrupts the vehicle's audio system to provide live location-specific traffic bulletins, including estimates of how long the driver is likely to be delayed.
- Traffic*master's* dynamic route guidance system uses GSM cell broadcast technology to feed live traffic information to navigation systems. The navigation system can graphically display traffic information directly on a on-screen digital map, calculate the fastest route avoiding traffic problems en route and provide predicted trip times for the next hour.
- Traffic*master's* national broadcast of live traffic information provides a visual display of 120 maps showing traffic speeds on discrete segments of the road network. Any area of the country can be selected to view current live road conditions with four zoom levels.
- Traffic*master's RAC Trackstar,* using satellite tracking provides real-time location of stolen vehicles anywhere in the UK and Europe. When a vehicle is stolen, the *Trackstar* unit is activated and the control center is alerted to the vehicle's exact position and direction of travel. The vehicle is then continually tracked by satellites. The same system also offers emergency and breakdown call services. By simply pressing a button, the stranded motorist can call either the emergency or breakdown services. A two-way voice communication i simultaneously opened, allowing the emergency or breakdown call center to speak directly to the motorist.

Source: Personal communications; company literature

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS** NO. 4.1.8

CONCEPT: Dynamic Scheduling and Routing

PROJECT NAME: *IndelcoStar*

LOCATION: Various cities in Europe

IndelcoStar is a computerized taxi dispatch and management system now used in some 40 cities throughout Europe. Because of its versatility and proven productivity it is rapidly becoming the standard reference taxi fleet management system in Europe.

When a customer calls and orders a taxi, the address from which the call originates is automatically identified and logged in, and the nearest available taxi is contacted. All this is done automatically by the computer in the taxi dispatch center (TDC) without the intervention of a human dispatcher. The computer flashes the taxi ID number and estimated time to reach the customer on the dispatcher's monitor screen. The dispatcher then verbally communicates this information to the customer. At the same time, the order is communicated to the taxi driver who must acknowledge and accept the order. If the driver does not accept the order, the computer will immediately search for and contact the next nearest taxi. Once accepted, all relevant order information is sent to the vehicle and archived in its onboard computer. After picking up the customer, the driver logs in the time of pick-up and drop-off, both of which are communicated to the TDC. By calling a special telephone number, a customer can immediately obtain the estimated waiting time to pick-up through a synthesized voice message system

The TDC monitors the movement of its entire vehicle fleet in real time with the help of a global positioning system (GPS). The TDC maintains two-way radio communication with all vehicles, in addition to a wireless data link. Voice communication can be arranged with individual drivers or with the whole fleet. Ordinarily, a vehicle will be contacted only when its services are requested, so that drivers are not exposed to the constant chatter from the dispatch center.

The fully computerized IndelcoStar system has been found to increase TDC productivity and improve customer service by reducing wait time and keeping the customer currently informed of the status of his request. Taxi operators praise the system for providing an additional measure of security since each vehicle is equipped with an emergency alarm activated with a hidden button. Once the alarm is activated, the exact location of the vehicle can be instantly determined through GPS, and the police notified.

Source: Traffic Technology International, Dec 1999/Jan 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS** NO. 4.2.7 Rev

CONCEPT: Passenger Information Systems

PROJECT NAME: *NextBus; BusCall; TransitWatch*

LOCATION: Bemidji MN; Seattle WA, San Francisco, 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.

In **San Francisco**, a *NextBus Information System* has been installed at ten bus stops along the 22-Fillmore route. As in Seattle’s *TransitWatch*, the system utilizes Global Positioning System technology to track its bus vehicles. The vehicle location data is transmitted to the central dispatch center where it is integrated with data on traffic flow to calculate the amount of time it will take each bus to reach the next stop. The data is transmitted to electronic signs installed at the bus stops.

Ref: Understanding and Applying Advanced On-Board Bus Electronics, TCRP Report 43 (1999)
“NextBus Launches Test on Muni” (press release); “NextBus” (information brochure)

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS** NO. 4.2.8

CONCEPT: Passenger Information Systems

PROJECT NAME: Train *Infoscreen*

LOCATION: Hamburg

The *Hamburger Hochbahn AG*, Hamburg's rapid transit system, one of the largest in Germany, has installed an innovative passenger information system in its subway cars. *Infoscreen*, consists of 15" video monitors, two per car, with flat double display screens. The monitors serve several functions. They display "next station" alerts with a matching recorded voice announcement; they transmit public service announcements, (e.g. service disruptions and cancellations and alternative arrangements for travel by bus); and they advertise new transit services. Apart from passenger information, the system offers a varied program of news headlines, local event listing, weather reports, sport scores, cartoons, interspersed with commercial advertising. The cost of procurement, installation, maintenance and operation of *Infoscreen* is born solely by its commercial operator, *Infoscreen Hamburg*, which derives income from advertising. The transit company not only pays nothing, it shares in the advertising revenue.

Each car is equipped with an independent multimedia computer which stores the film clips, photographs, graphics and text shown on the screen. The passenger information system thus requires no cable connections between cars. If one unit breaks down, the other units are unaffected. When a train arrives at one of ten selected stations, a wireless connection is established with a local server which downloads data to the train's multimedia computers. At least 25 megabytes of video and text material can be transferred during a customary 40-second dwell time at stations – enough for about 15 minutes of programming. When the train leaves the station, the network connection is automatically deactivated when the strength of the radio signal falls below a certain threshold. Additional data is transferred at the end of the line, where dwell times are longer.

A total of seventy-one trainsets of *Hamburger Hochbahn* have been equipped with *Infoscreen* so far. Eventually, all cars on the Hamburg rail system will be equipped. A similar system is being introduced in Munich and Berlin.

Source: Public Transport International, January 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS** NO. 4.4.1 Rev

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 in Germany 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; Mass Transit, May/June 1998

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS** NO. 4.4.2.

CONCEPT: Track Sharing (Update)

PROJECT NAME:

LOCATION: Bremen, Germany; Geneva, Switzerland, Luxembourg

Tracksharing is the name given to the seamless extension of urban streetcar service into outer suburbs and beyond by physically interconnecting streetcar networks with existing mainline rail tracks and running dual voltage light rail vehicles on the combined rail network. The service concept eliminates the need for intermodal transfers and cuts commuting time significantly since the streetcars can travel all the way downtown directly from the outlying suburbs. Pioneered by the City of Karlsruhe, where the network now penetrates 126 km into the surrounding region (see 4.4.1 Rev.) the practice has spread to a number of other cities in Germany and other European countries. The latest entrants are the cities of Bremen, Geneva and Luxemourg.

In **Bremen**, (pop. 550,000), a regional *Stadt Bahn Bremen (SBB)* will ultimately link the city's western and eastern suburbs in a two-line, 60 km network. The proposed SBB will use both the *Deutsche Bahn* intercity tracks and the *Bremer Strassenbahn AG* city tram tracks in a dual voltage system inspired by the Karlsruhe model. A new kilometer-long section of track will be built around the main railroad station to connect with the city-based tram system. The tram fleet, currently consisting of 78 triple-articulated light rail cars will be replaced by new dual voltage models starting in 2003. The *Bremer Strassenbahn AG*, which operates the city's tram system, carries some 93 million passengers a year.

In **Geneva,** *Transports Publics Genevois,* the public transit operator in Geneva (pop. 350,000) plans to provide seamless rail service from Geneva's outlying western suburbs which lie beyond the frontier, in France, to the center of Geneva by physically linking the city tram network with the intercity tracks of the French National Railways outside the city limits. Dual voltage light rail vehicles will be provided by *Secheron.*

In **Luxembourg,** a regional tram network, known as the BTB, will utilize existing tracks of the national railway and a new 17-km network of streetcar tracks in the city. Luxemourg's regional tram system is expected to account for more than half of the passenger traffic now carried by the national railways.

Source: Passenger Transport, October 25, 1999

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INNOVATIONS IN TRANSIT SERVICE & OPERATIONS** NO. 4.5.4

CONCEPT: Innovative Transit Marketing Strategies

PROJECT NAME: *Le Touc* Electric Vehicle Shoppers Service

LOCATION: Toulouse, St. Raphael, Aix-en-Provence, France

Since early 1999, an enterprising French company known as *Le Touc* has been operating electric minicar services in three French cities under contract with local downtown supermarkets. *Le Touc* pick up clients of the supermarkets at their residence, brings them to the store, and helps them to get their fully loaded shopping bags back home – all free of charge. Publicity about the new service is available in the stores and is prominently displayed on the sides of the vehicles. The costs are borne by the supermarkets as a customer service under a monthly contract. The increase in sales more than pays for the service, according to the supermarkets. On an average day, 150 customers avail themeselves of the service in each of the three cities. However, only a handful ask for a home pickup. To avoid problems with the taxicab associations, the *Le Touc* delivery servive is limited to a radius of about three kilometers from the sponsoring stores.

Source: Public Innovation Abroad, June 1999

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS (ITS)** NO. 4.7.5

CONCEPT: Electronic Fare Collection (Smart Cards)

LOCATION: Various locations throughout Europe

People have become accustomed to using credit cards for a multitude of financial transactions, from paying restaurant and hotel bills to purchasing air line tickets. Increasingly, they are using “smart cards” as a universal public transport credit card. What sets smart cards apart from ordinary credit cards is an imbedded microprocessor chip that can store large amounts of data. While stored-value “debit” cards using magnetic stripes have been in use for many years, smart cards offer the advantage of holding up to 30 times more data. The smart card is able to factor in a host of variables when calculating fares, such as different price structures for every transit operator, transfers, routes, destinations, time of day and discounts for students and elderly riders. Another advantage of smart cards over magnetic stripe cards is that they can be read remotely. A user need only to wave the contactless card within 5-6 inches of an electronic reader located on transit vehicles or at station fare gates, and the correct fare will be deducted in a fraction of a second. When the balance drops too low, riders are able to add additional value through credit card accounts, fare machines located in transit stations, and at specially equipped pay phones placed at strategic locations. By the year 2003 there will be over 45 million smart cards in use on European public transportation systems, according to *Datamonitor*, an international marketing firm. A summary of significant initiatives follows:

London Transport is installing a massive new ticketing and fare collection system that will be based on contactless smart cards. Covering 6000 city buses as well as underground rail, the system is being rolled out in phases, beginning in late 2002. The RATP transport system in the **Paris** region, which carries 9 million passengers a day, has developed and is testing a contactless smart card. Initially, 40,000 RATP employees will be provided with the smart card. At the conclusion of the test, a decision will be taken whether to deploy the smart card system to the entire public transport network in the Ile de France region surrounding Paris and its ten million residents. A contract was recently awarded to install a smart card fare collection system for the bus, rail and tram networks in **Rome** and the surrounding region over the next two years, with operation starting in Rome by July 2000. Initially, up to 500,000 smart cards will be issued, a number expected to increase to more than one million cards within the first year. The Transport Authority of **Berlin** will begin testing a smart card ticket system in October 1999. Approximately 25,000 participants will use the cards on two subway lines, two bus routes and a tram line in Berlin and the surrounding area. Full operation is set for 2002. A consortium of transit operators and Spanish banks will test the use of smart cards by transit riders in **Madrid** and **Barcelona** later this year. The transit fare cards will be combined with VisaCash cards already used by over 5 million consumers in Spain for retail purchases. The Ministry of Transport, Public Works and Water Management in the **Netherlands** is exploring the feasibility of replacing paper transit tickets with smart cards, recently awarding a contract for a pilot project in the city of **Groningen.** Involving 80 buses and 10,000 smart cards, the trial of the “Tripperpas” is set to begin in mid-2000. Applications may extend beyond transit, to include parking and other uses.

Source: Innovation Briefs, Nov/Dec 199

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS (ITS)** NO. 4.7.6

CONCEPT: Electronic Fare Collection (Smart Cards)

LOCATION: Hong Kong and Singapore

Launched in 1996, Hong Kong's "Octopus" contactless smart card fare collection system is the largest in the world. Five and a half million customers a day use the card to travel on ferry, bus, and light- and heavy-rail lines operated by several transit systems. Some 2.7 million smart card transactions take place on the Hong Kong transport system every workday.

A contactless fare card system that is likely to rival Hong Kong's Octopus will be coming to Singapore over the next two years. Singapore's Land Transport Authority is implementing an integrated systemwide smart card system that will cover five public transport operators carrying a total of over 1.5 million trips a day. The combined system will involve 22,000 electronic readers and an initial five million contactless smart cards. When the system is fully operational in 2002, cardholders will be able to use the smart card for a variety of other transport-related transactions, such as taxi fares, parking fees and congestion tolls.

Source: Public Innovation Abroad, June 1999

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS (ITS)** NO. 4.7.7

CONCEPT: Electronic Fare Collection (Smart Cards)

PROJECT NAME: *TransLink*

LOCATION: United States

A smart card system that would be valid on all of the region's bus, rail and ferry systems is being implemented in San Francisco Bay Area. The *TransLink* project got under way in May 1999, when MTC awarded a 10-year contract to a consortium led by Motorola, Inc. and ERG Ltd. of Australia to develop the system. A six-month demonstration of the smart card will begin in the autumn of 2000 on selected routes of six local and regional transit systems in the Bay Area. Together, these systems will offer a full range of testing environments, including commuter rail, regional rapid transit, municipal light rail, buses and ferries. If the demonstration is successful, MTC will proceed with full deployment of *TransLink* on the region's balkanized transit system, beginning in 2001.

While *TransLink* is by far the most ambitious electronic transit payment project in the United States, other U.S. cities are not standing still. The 100-mile Metrorail system serving Washington D.C. and nearby suburbs paved the way as the first major U.S. transit system to introduce smart cards. After several months of testing, the Washington Metropolitan Area Transit Authority (WMATA) launched its SmarTrip card in May 1999. The contactless card can also be used to pay for parking in Metrorail station parking lots and eventually will be used on buses.

Chicago will likely be the next U.S. city to begin using smart cards in its transit system, following a successful pilot program for disabled patrons. Smart card fare equipment has been installed on 3,300 city and suburban buses and the rail transit system. In the Seattle area, seven transit providers are collaborating on a project to create a regional smart farecard system for their 2,200 buses as well as for ferries and commuter trains. Current plans are to begin revenue service in 2002. Finally, Amtrak plans to introduce smart cards as part of an automated fare collection system that will be installed on the new *Acela Express* high-speed rail service between Boston, New York and Washington D.C. early next year.

Source: Traffic Technology International, Sept/Oct 1999

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INTELLIGENT TRANSPORTATION SYSTEMS (ITS)** NO. 4.7.8

CONCEPT: Electronic Fare Collection (Smart Cards)

PROJECT NAME: Multi-application *Smartcities* Card

LOCATION: Southampton, U.K.

Southampton is the site of a pilot project to see if smart cards can fill an entire city's transactional needs, including transport-related fees and access to the city's various facilities and services. The *SmartCities* card is designed to replace a range of cards currently used by residents of Southampton. Cardholders will be able free to select the applications they wish to include on their card, adding and removing applications by using a public-access city terminal or the city's Internet website. Ultimately, cardholders will be able to use the smart card to charge public transport fares, parking meter fees, bridge tolls, auto license fees, motor vehicle violation fines and mobile phone charges, as well as user fees for various city facilities and services such as libraries, public swimming pools, school meals, and museums.

The 30-month pilot project is co-sponsored by the City of Southampton and the European Union. Participating in the test are the University of Southampton and Schlumberger, the world's leading smart card provider

Source: City of Southampton literature

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **ADVANCED TRANSIT SYSTEMS** NO. 5.1.8

CONCEPT: Automated Guideway Transit

PROJECT NAME: CIVIS

LOCATION: Lyon, Grenoble, Clermont-Ferrand, Rouen, France

Four French cities have opted for an innovative electric-hybrid trolleybus vehicle system, known as CIVIS, developed by Matra and Siemens. (see 5.1.3) The rubber-tire vehicle operates on a dedicated guideway and relies on an optical sensor mounted in front of the steering wheel to keep the vehicle from straying off the guideway. The optical system keeps the vehicle on the designated alignment with a tolerance of a few centimeters. No expensive infrastructure is required to install the busway, since the optical guidance are merely painted markings on the guideway pavement. Power is supplied from an overhead trolley catenary. The driver can manually override the optical guidance system at any time, and drive off the guideway by switching to a battery or an auxiliary diesel unit.

By combining the speed of a fixed guideway vehicle in congested city centers with the flexibility of a bus in lower density suburban areas, CIVIS is viewed by the French authorities as an ideal transit solution for small and medium-size cities. More than 200 of the CIVIS units are on order by Lyon, Grenoble, Clermont-Ferrand and Rouen.

Source: Passenger Transport, November 29, 1999

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **ADVANCED TRANSIT SYSTEMS** NO. 5.1.9

CONCEPT: Automated Guideway Transit

PROJECT NAME: Personal Rapid Transit

LOCATION: Chicago

The Regional Transportation Authority of Chicago announced in May 2000 that it was terminating its project with Raytheon Company to develop and build a Personal Rapid Transit (PRT) system in the Rosemont district near O'Hare Airport. The system was to connect various hotels, office buildings and the airport terminal with non-stop, origin-to-destination service via a network of small, four-passenger vehicles operating on dedicated guideways, and dispatched to stations on demand, like elevators. The system's elevated guideways were designed to require minimum right-of-way and to be easily expandable.

The RTA began examining the potential of the PRT in late 1990 to reduce congestion and enhance mobility in the crowded Rosemont airport district. It was the RTA's intention to implement the PRT systems in several other suburban activity centers, if the Rosemont pilot system proved to be technically and economically feasible. In 1993, the RTA selected Raytheon after a competitive bidding process to develop and test a PRT system. Raytheon successfully completed testing of a prototype PRT system in the summer of 1998 at its Marlborough MA facility. However, the design proved to be too expensive and the guideways too obtrusive, leading the RTA to cancel the project

Source: Passenger Transport, May 2000, Toll Roads Newsletter, April 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **ADVANCED TRANSIT SYSTEMS** NO. 5.2.2

CONCEPT: Magnetic Levitation (MagLev) Systems

PROJECT NAME: TRANSRAPID

LOCATION: Berlin-to-Hamburg Corridor

In 1994, the German government made a momentous decision, to build the first commercial maglev line between Berlin and Hamburg. In the eyes of its advocates, the TRANSRAPID would showcase German engineering, propel Germany to technological pre-eminence and offer a prospect for lucrative export orders. The 300 km line would cut travel time in more than half, from two-and-a-half hours to barely an hour, and enable ground-base systems to challenge airlines for medium distance travel.

After six years of developmental work and an expenditure of DM2.2 billion, the project was abruptly cancelled on April 15, 2000. The need for project was increasingly being questioned in view of Germany's highly successful intercity high speed ICE network which criss-crosses the country north-south and east-west, connecting all major urban regions. Third generation ICE trains now under development, maglev critics contended, would just take 20 minutes longer between Berlin and Hamburg than the TRANRAPID, but cost less than half the price.

The death blow came last month, when the government said it would cap TRANSRAPID spending at DM6.1 billion – the original forecast for the Berlin-Hamburg line. The spending ceiling meant that the link could only be built as a single line, sharply cutting capacity. The decision played into the hands of Hartmut Mehdors, new head of *Deutsche Bahn* and a longtime critic of the TRANSRAPID. To keep the project alive, the government, DB and the contractors (Siemens and DaimlerChrysler) agreed to examine alternative scaled-down routes, such as the 30 km link between Munich's airport and the city center or between Berlin's new airport at Schonenfeld and the capital.

Source: Financial Times, February 11, 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INNOVATIVE INFRASTRUCTURE FINANCING** NO. 6.1.5

CONCEPT: Private Toll Roads

PROJECT NAME: Highway 407

LOCATION: Toronto, Canada

The recently completed $2.68 billion privatization of the 69-km Highway 407 (see 3.6.3) marks the largest transaction of its kind in the western hemisphere. The highway, built originally as a 30-year concession, has been in revenue operation for the past two years and has been highly successful, carrying an average of 210,000 vehicles a day. As part of the recently concluded sale agreement, all shares of the original concession were transferred to the winning consortium which comprises CINTRA (Spain) and a SNC Lavalin (Canada). The agreement stipulates that the new concessionaires will have the right to collect tolls for 99 years. As part of the transaction, the new owners have committed to building 39-km of east-west extensions within 30 months from financial closure.

Source: Traffic Technology International, June/July 1999; Public-Private Partnerships in Toll Road Development: An Overview, Transportation Quarterly, vol. 54, No. 2, Spring 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INNOVATIVE INFRASTRUCTURE FINANCING** NO. 6.1.6

CONCEPT: Private Toll Roads

PROJECT NAME: *The Dulles Greenway* (Update)

LOCATION: Northern Virginia, USA

The *Dulles Greenway* has had a remarkable turnaround in the past two years. In its first three years, 1995 through 1997, it defaulted on debt service and was on the brink of bankruptcy. Traffic was barely 10,000 vehicles /day (see, 6.1.3). But since then the *Greenway* has managed to aggressively market its value to motorists and to turn itself around. Today, traffic is 43,000 vehicles/day and its toll has been progressively raised from $1 to $2 for a car traveling the full distance of 14 miles. Helping in the turn-around has been rapid growth of the telecom and internet industry in the Dulles corridor (AOL, MCI/Worldcom, UUNet) with its massive office facilities and housing units for thousands of employees. The Greenway is now refinanced and profitable, having gone from an embarrassing lack of traffic 40 months ago to a recent announcement of plans to widen the eastbound roadway from two to three lanes in order to accommodate rising traffic.

Source: Toll Roads Newsletter, Nov/Dec 1999; March 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INNOVATIVE INFRASTRUCTURE FINANCING** NO. 6.1.7

CONCEPT: Private Toll Roads

PROJECT NAME: Melbourne *City Link*

LOCATION: Melbourne, Australia

Melbourne *City Link*, the first section of which opened late in 1999, is the world=s largest privately financed urban toll road, in addition to having one of the most advanced electronic toll collection systems (see 3.6.5). The 22-km facility, consisting of roads, tunnels and a bridge over the Yarra River, provides a bypass of the Melbourne central business district and links three previously unconnected radial motorways as well as major sea, rail and air terminals.

The operator of the new facility, Transurban City Link Ltd., is a publicly traded company which has a 34-year concession in return for financing and building the facility. The overall cost of the project was approximately $1.3 billion. To maximize revenue, Transurban opted for a free-flow, non-stop electronic toll collection technology that would accommodate the habitual commuters user without discouraging the occasional user. Regular commuters buy a transponder and pay a maximum $2.40 toll per trip. A total 300,000 transponders have been issued so far. Occasional users purchase a Day Pass which entitles the user to unlimited travel for the day for a flat fee of $4.50. The Day Pass is enforced through license plate imaging. The license plates of vehicles without transponders are photographed and checked against a list of vehicle license plate numbers of patrons who have purchased Day Passes.

Source: Toll Roads Newsletter, Nov/Dec 1999

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INNOVATIVE INFRASTRUCTURE FINANCING** NO. 6.2.6

CONCEPT: Public-Private Partnerships

PROJECT NAME: Tacoma-Narrows Bridge

LOCATION: State of Washington, USA

After five years of negotiations, the Washington State Department of Transportation has signed a franchise agreement with a private consortium to build a new bridge across the Tacoma Narrows. The existing bridge already carries more than 80,000 vehicles per day in both directions, and is functioning at 30% over its design capacity. The new bridge will carry three tolled eastbound lanes of SR 16. The existing bridge will carry three untolled westbound lanes. The total project cost is estimated at $350 million.

The project is the sole survivor of an initial six toll demonstration projects selected by Washington State DOT from among 14 proposals received in 1994. Voters in the region approved the project in a state-mandated vote held in November 1998. Washington State DOT will support the project funding by providing approximately 15% of the total project cost through grants for right-of-way, environmental approvals and approach road improvements. The bulk of the cost will be financed through non-recourse tax-free bonds.

Source: Public-Private Partnerships in Toll Road Development: An Overview, Transportation Quarterly, vol. 54, No. 2, Spring 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **INNOVATIVE INFRASTRUCTURE FINANCING** NO. 6.2.7

CONCEPT: Public-Private Partnerships

PROJECT NAME: Southern Connector Extension

LOCATION: Florida, USA

The Florida DOT has worked out a teaming arrangement with four private developers to build a 10-km Southern Connector Extension (SCE), a four-lane limited access toll road connecting I-4 with the Central Florida Greenway, a beltway around Orlando. The private developers, that include Disney Development Co and other land owners in the SCE alignment, have put up half of the total project cost through equity and short-term debt contributions. The Florida DOT is designing, building and operating the toll facility, and is retaining the bulk of the toll revenue. In exchange, the developer group will be provided with significant development rights for land along the SCE corridor. In exchange for the development rights the group provided funds for three-quarters of the right-of-way acquisition, two interchanges and a construction fund cash subsidy.

Source: Public-Private Partnerships in Toll Road Development: An Overview, Transportation Quarterly, vol. 54, No. 2, Spring 2000

INTERNATIONAL MOBILITY OBSERVATORY

INNOVATION FACT SHEET

STRATEGY: **NOVEL INSTITUTIONAL ARRANGEMENTS** NO. 8.3.1

CONCEPT: Regional Incident Management Coalitions

PROJECT NAME: Delaware Valley Tri-State Incident Management Coalition

LOCATION: Delaware-New Jersey-Pennsylvania, USA

Citing traffic incidents as a major cause of interstate highway congestion, accounting for 60 percent of highway delay, state departments of transportation of Delaware, New Jersey and Pennsylvania have banded together to minimize disruption from incidents and coordinate incident detection, response and clearance in the busy northeast travel corridor.

The coalition, the first such initiative in the nation, will enlist the services of traffic management centers, Highway Operations Groups (HOGs), police and emergency services, and disaster relief teams of the individual states in a coordinated attack on the problem. State-of-the-art technologies employed by the individual services will be placed at the disposal of the coalition. These include highway video cameras, variable message signs, global positioning systems and an elaborate system of pre-planned diversion routes.

Source: Press dispatches