Smart Jitney/Community-Enhanced Transit Systems

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EXECUTIVE SUMMARY

Adding a new, door-to-door, route-deviation, microbus service to your existing transit-paratransit-ridesharing system could increase your ridership and farebox recovery rates significantly. It could also:

- Improve feeder services to and from your fixed-route, fixed-schedule, bus and rail lines.
- Provide door-to-door transportation services in corridors where (i.e. low-density suburban and rural areas) conventional modes are not cost-effective.
- Provide door-to-door transportation services in corridors when (i.e. late-at-night, weekends, holidays) conventional modes are not cost-effective.
- Reduce demand for limited park-and-ride lot spaces and lift-vehicle places.
- Provide backup transportation for more people who want -- whenever possible -- to walk, bike, or carpool with friends to get to work or school.
- Enable more households to get rid of their second or third cars (including vans, pickups and SUVs) or to earn extra income helping their neighbors and co-workers do this.
- Provide many new opportunities for public-private transportation partnerships to improve transportation services and many other "Smart Community" activities.

Market research in the Seattle-Tacoma area for the Federal Transit Administration (FTA) by the University of Washington found that new, door-to-door, route-deviation, microbus services -- also known as (aka) "Smart Jitney", single-trip carpool and dynamic ridesharing services – could attract large numbers of commuters out of their Single-Occupant Vehicles (SOVs) and reduce congestion significantly.

Furthermore, the wireless telecommunications infrastructure required to implement Smart Jitney services and to integrate them with existing transit-paratransit and ridesharing modes -- in a cost-effective manner -- are now being installed throughout the world for a wide variety of other transportation and non-transportation applications. In fact, towns, cities and counties across the U.S. are now installing mesh networks to provide low-cost, wireless-Internet services for almost anyone who lives, works or visits there.

This paper will explore how low-cost, multi-purpose mesh networks can create Smart Jitney/Community Systems that can solve a variety of transportation and other problems at a low cost to both users and taxpayers. Smart Jitney/Community-Enhanced Transit Systems can also help the U.S. (and other countries) realize and even broaden some of the original visions of the USDOT leaders who established the Intelligent Vehicle-Highway System (IVHS) program – now known as the Intelligent Transportation Systems (ITS) program -- in the early 1990s.

VISIONS OF PAST USDOT LEADERS

In an article in "Technology and the New Transportation" (1), former Secretary of Transportation and former Secretary of Energy Frederico Pena noted the

possible and desireable close relationship between the IVHS program and the National Information Infrastructure (NII) or "Information Superhighway" program as follows:

"Imagine what life in America will be like when the journey toward deployment of Intelligent Vehicle-Highway Systems (IVHS) is complete. What will emerge is a society infused with information systems that not only connect all modes of transportation into one cohesive system, but also link transportation to the information superhighway. ….

This seamless system of information and transportation will serve a world in which a suburban commuter can wake up in the morning, flip on a computer or television and obtain accurate travel data to help him decide how to get to work that day - or whether to commute to work at all ..... This brave new IVHS world will encourage use of transit systems - not simply put more single-occupant vehicles (SOVs) on our highways. It will also incorporate a broader information system that eliminates many routine trips .....

The IVHS industry in America is projected to grow to as much as $200 billion a year by early in the next century. In sheer economic terms, if we even approach that sort of projected growth for IVHS, the federal investment in this program will be one of the most productive investments that our government has ever made. It will also be one of the most effective examples of how federal investment can "leverage" private sector involvement and response."

In an article in the same publication, Secretary of Transportation Rodney Slater also noted the possible and desirable close relationship between the IVHS and the NII programs. He also expanded on the need to use federal funding to attract much greater funding from the private sector and from state and local governments in order to achieve the important goals of these synergistic programs as soon as possible. In Secretary Slater's words:

"It is essential - if we are to truly move toward deployment - to begin to think of IVHS technology as more than isolated research projects, operational tests and demonstrations. We need to make the application of technology the "standard practice" not just the "exception".

The central issue facing the deployment of IVHS in the coming years is, I believe, mainstreaming the use of technology to help the Nation achieve important transportation and societal goals ..... State and local agencies, as well as private industry, must also recognize that the federal government is not the only resource for funds. We need to think of private as well as public funds to apply technology. The risks are there for the private sector - but so too are the benefits.

America's economic future depends on the nation's capacity to invent, master, and apply new technologies. It depends on moving ideas to the marketplace to spur growth, create new jobs, and strengthen our industrial performance. Vice President Gore had identified (these) broad initiatives as part of the National Information Infrastructure…"

In another article in "Technology and the New Transportation", the CEO of the Federal Transit Administration, Gordon Linton, made the following statement:

"We learned early in this (smart traveler/single-trip carpool) project that 42 percent of "drive-alone" commuters (in the Seattle-Tacoma area) would consider the "instant ridesharing" made possible by such a system. So, sooner than you may think, your daily commute may begin with you logging into your home computer. One program will tell you if any members of your carpool are out sick. Another will let you check for commuters looking for a carpool in your area.

Ridesharing groups using HOV lanes are finding such electronic communication invaluable. They can find an immediate replacement when one or more of their regular riders is out sick The system is also useful to people who only occasionally need to catch a ride with someone. Smart transportation technology and multimodal approach to our transportation problems can give us a wide choice of invaluable tools for addressing traffic congestion, the mobility needs of the transit dependent, environmental quality, and the humanization of our transportation systems."

VISIONS VERSUS REALITIES

Unfortunately, these lofty visions of the future – which were made in 1994 – could also be the lofty visions of he future for today's transportation leaders. If anything, things have gotten worse, rather than better, over the past 12 years. For example, traffic congestion has been increasing every year and there do not appear to be very close ties between the transportation-focused IVHS/ITS program and the multi-purpose NII "Information Superhighway" program.

The following blunt statements about the status of ground transportation in the United States were contained in a report (2) prepared by the U.S. Department of Transportation (USDOT) and its consultants. Furthermore, they are truer today than they were when they were made in 1995:

"Despite the fact that the United States has one of the best roadway systems in the world, mobility is declining and safety remains a serious problem. Congestion takes its toll in lost productivity, costing the nation an estimated $100 billion each year. Traffic accidents represent another $70 billion in costs, not including the loss of life or consequences of long-term injury. Inefficient movement of vehicles reduces productivity, wastes energy, increases emissions, and threatens the quality of life we enjoy. Transportation is vital to the social and economic health of the nation. The efficiency and effectiveness of surface transportation has direct impacts on economic growth, land use, competitiveness, and accessibility to health care and social services…

Land use patterns determine, to a large extent, how transportation needs can be met. Demographic patterns further help to define the transportation needs of the population. Long-term shifts from urban to suburban living have made suburb-to-suburb travel the dominant commuting pattern in the United States. Low-density development makes the provision of (conventional) public transit services prohibitively expensive. However, to maintain mobility in suburban (as well as urban) areas, the average occupancy of vehicles must be increased...

Fixed-route (bus and rail transit) service involves the operation of high-occupancy vehicles over predetermined, fixed routes according to a published schedule. These services are most applicable to corridors with a relatively dense population to generate the ridership necessary to justify the cost of providing the service. In low-density areas, conventional fixed-route transit is prohibitively expensive and cost inefficient. The transit agency's desire to provide service is balanced by the need to manage the fleet in the most effective and efficient manner. In these lower-density areas, flexibly-routed transit offers a more cost- effective transportation alternative to the single occupant automobile…"

This federal report does not discuss what types of "flexibly-routed transit" should be used to provide more cost-effective transportation services in low-density suburban and rural areas and at low-travel times in all but the highest-density corridors. Let us, therefore, look at two of the most popular flexible-route transportation services -- Dial-A-Ride (DAR) and Route-Deviation.

FLEXIBLE-ROUTE TRANSPORT SERVICES

During the 1960s and the early 1970s, Dial-A-Ride (DAR)-enhanced transit systems were installed in and around many U.S. cities -- including San Jose, California – to try to make public transportation more cost-effective in low-density suburban areas. According to the NY Times, the San Jose/Santa Clara County system – which covered more than 200 square miles – "failed (in less than six months) because it was more successful in luring riders than its organizers expected it to be. ….. It attracted too many riders for the budget."

The following are a few other observations from the system's "obituary" in the NY Times:

"With a telephone call, any of the county's 1.2 million residents could summon a (mini-) bus to their door. A (mainframe) computer was used to identify which of dozens of (mini-) buses were cruising closest to the caller's home.

Then, the (mini-) bus took the caller to the doorstep of his destination if it was not far away. If it was more than several miles away, the rider was transferred to a conventional bus traveling on regular fixed-routes, taking him to a point where he could transfer to another "dial-a-ride" minibus.

(The innovative Santa Clara DAR system) was the first to guarantee door-to-door service in a large metropolitan complex, the first to use computers extensively for sequencing pickups, and the first to use integrated neighborhood pickups with conventional, fixed-route, arterial buses."

German transit experts studied the strengths and weaknesses of DAR-enhanced, bi-modal transit systems in and around San Jose and other U.S. cities to design their tri-modal, Ruf-Bus (i.e. "Call-A-Bus) and Flexible Operations Command & Control Systems (FOCCS) in the late 1970s and early 1980s. To reduce telephone operator costs, these innovative systems used kiosks at bus stops to let customers request rides directly from the dispatching DEC minicomputer. To reduce the labor costs associated with voice dispatching, the DEC minicomputer communicated pickup and delivery instructions directly, via wireless "telegrams", with the computer terminal in each bus (including trains), minibus or microbus (i.e. taxi) in the public-private fleet.

In addition to fixed-route and DAR modes, the German Ruf-Bus systems used their "buses" in a route-deviation or "wide-corridor" mode, where the starting, the ending and other standard" bus stops" were the only ones guaranteed to receive service on-schedule during any run. 10-15 minutes of deviation time was usually built into these "wide corridor" runs to let "buses" depart from their basic route, at the direction of the dispatching computer, to visit a few optional bus stops to pickup or deliver scheduled passengers.

Although the tri-modal FOCCS approach has made some public transportation systems in Germany, the U.S. and other countries much more user-friendly, they have not made them more taxpayer-friendly. Transit subsidies per passenger trip have not dropped and transit ridership per capita has not increased significantly. As a result, the use of Single-Occupant Vehicles (SOVs) and traffic congestion continued to grow for commuting and many other trips.

A MORE-QUANTITATIVE STATEMENT OF THE PROBLEMS

Rural, suburban and urban areas throughout the United States need help with their mobility problems, as the following statistics show:

"While two-thirds of Americans over age 65 now live in suburban or rural areas, only about half those areas have alternative transportation systems, reports the Community Transportation Association of America (3). . . . The millions who abandoned small towns have moved into urban areas, increasing traffic congestion, air pollution and other problems there. Rural towns have to provide a reason to stay. We don't just want to preserve rural areas for people to drive to on weekends. (4)

While two-thirds of all new jobs are in the suburbs, three-quarter of welfare recipients live in rural areas or in central cities. Even in metropolitan areas with extensive transit systems, studies have shown that less than half of the jobs are accessible by transit. In particular, many entry-level workers have difficulty reaching jobs during evening or weekend shifts when transit services are frequently diminished or non-existent. Work trips can also be complex, involving several destinations including child-care providers. The problems are equally challenging in rural areas: approximately 40 percent of rural counties lack public transit systems. (5)

Auto ownership among welfare recipients and low-income persons is also low. As many as 94 percent of welfare recipients do not own cars and nearly 40 percent of workers with annual incomes below $10,000 do not commute by car. In 1991, the median price of a new car was equivalent to 25 weeks of salary for the average worker and considerably more for the low-income worker. Transportation is clearly a key barrier to those moving from welfare to work. Providing a variety of new or expanded transportation options for low-income workers, especially those who are receiving or who have recently received welfare benefits, will increase the likelihood that those workers will get and retain jobs.(5)

The Americans with Disabilities Act (ADA) makes access to public transportation for disabled individuals a national goal. In addition, the population in the United States is aging as the baby-boom generation matures. Access to safe, convenient, cost-effective transportation is essential for the economic and social health of the nation, since lack of adequate transportation limits access to employment, education, medical care, and social and other essential services..."

Improved public transportation services are a key to improving the quality of life in low-density areas at all times and in many higher-density areas at low travel times. However, it does not appear that any mix of conventional transit, paratransit and ridesharing services – including DAR and route-deviation services with salaried or hourly-wage drivers -- will be able to solve these mobility problems. They simply cannot provide a level of service that is attractive to prospective users, at subsidy levels that are attractive to taxpayers. Something unconventional will be needed to solve the mobility problems of rural areas in a cost-effective manner. But what? (Question I)

Table 1 shows how much travel by Multi-Occupant Vehicles (MOVs) declined and how much travel by Single-Occupant Vehicle (SOV) increased between 1980 and 2000 for journey-to-work trips in the United States. No wonder traffic congestion has grown by leaps and bounds in U.S. metropolitan areas, where it is often very difficult and very expensive to add highway capacity.

Although Table 1 shows that the use of conventional transit by workers increased 10% between 1980 and 2000, conventional transit still lost market share because the number of workers who commuted to work in some sort of motor vehicle increased by 30%. The rapid decline in the use of carpools and vanpools, both in numbers of workers and market share, is the primary reason SOV use increased

so much between 1980 and 2000. Many workers in the Service Sector (i.e. most of today's workers) find it difficult to use these conventional ridesharing modes for commuting because they often have irregular work schedules.

Ridesharing programs have been successful in reducing traffic in some situations. One example is the State of Washington, which has approximately 1,800 vanpool vans in operation carrying 15,000 riders daily at very little cost to the taxpayers. The King County Metro Transit Rideshare Program alone has 739 vanpools and 111 vanshares. The vanshare program, which is relatively new, provides vans at transit centers that are used by people getting off a bus or train to get to their place of employment. The Internet ridematching website RideshareOnline.com was available throughout Washington in 2005 when gas prices created a new interest in carpooling. Registrants looking for a carpool jumped 50% from 2004 to 13,000 registrants. But the situation in Washington is unusual.

Improved public transportation services are also a key to reducing traffic congestion problems in the suburbs of large cities, where most metropolitan area residents now live and work. However, is does not appear that any mix of conventional transit, paratransit and ridesharing services – including DAR and route-deviation services with salaried or hourly-wage drivers -- will be able to solve these problems. They simply cannot provide a level of service that is attractive to residents of these low-density areas, at subsidy levels that are attractive to taxpayers. Something unconventional will be needed to solve the transportation, energy and environmental problems of suburban areas, and adjacent urban areas, in a cost-effective manner. But what? (Question II)

	1980		2000	
Means	Millions	(%)	Millions	(%)
Conv. Transit Users	6.0	(6.6)	6.6	(5.6)
Ridesharing Users	22.5	(24.8)	14.3	(12.1)
MOV Users	28.5	(31.4)	20.9	(17.7)
SOV Users	62.2	(68.6)	97.2	(82.3)
Motor Vehicle Users	90.7	(100.0)	118.1	(100.0)
Motor Vehicle Users	90.7	(93.9)	118.1	(92.7)
Other	5.9	(6.1)	9.3	(7.3)
Total Workers	96.6	(100.0)	127.4	(100.0)

Table 1: Means of Transportation to Work in the U.S. 1980 - 2000

Some transportation projects in the U.S. recent years have cost federal, state and local taxpayers more than $20,000, $50,000 or even $100,000 per year to take each additional vehicle off the roads during peak commuting hours. Although reducing the growth of traffic congestion and improving mobility are important goals, transportation decision-makers in both the public and the private sectors should constantly ask themselves: "Are there any new approaches or technologies that can help us accomplish our goals in a more cost-effective manner?" (Question III)

THE STRATEGY BEHIND SMART JITNEY/COMMUNITY SYSTEMS

The same USDOT document (2) that bluntly described the status of the U.S. ground transportation system also suggested a possible direction to look for the answers to the three questions raised in the preceding section. Note the following important points that its authors made about

tying mobility and accessibility and IVHS/ITS and the NII Information Superhighway closely together:

"The basic challenge for transportation decision makers is to provide mobility and accessibility for all. Mobility, simply defined, is the ability to travel from one point to another. Growing congestion in the United States threatens the mobility necessary to the economic and social health of the nation. The concept of accessibility, (which) includes both the ability to safely and conveniently use the available transportation systems, and the recognition that access to goods and services may be met without physical travel (e.g., home shopping, tele-banking, electronic mail).

The Information Superhighway, officially knows as the National Information Infrastructure (NII), will use emerging digital technology to revolutionize accessibility, including the delivery of communications, education, and entertainment services, among others. . . . The NII holds potential as a means to convey real-time information on various transportation systems and to provide accessibility to services without the need to travel. This potential can be seen now through the increasing use of telecommuting and a range of services, such as airline reservations and shopping, from various information providers using the personal computer platform.

It is important that there is currently sufficient passenger capacity in observed automobile usage to reduce congestion. This capacity is significantly underutilized due to the large number of SOVs. The high density of single-occupant vehicles is a principal contributor to congestion. Ridesharing, such as carpooling and vanpooling, represents an existing strategy for mitigating traffic congestion and improving management of existing facilities. Indeed, initial development of ridesharing can be seen as far back as the 1940s with promotion of carpooling to save gasoline and rubber during World War II.

Although ridesharing increased immediately after the war, recent statistics show a decline, and this transportation alternative is now vastly underutilized in most urban areas. There is an urgent need to take steps to encourage the public to make greater use of this option. The application of proven advanced technologies to make ridesharing more user-friendly and accessible can help reverse the declining trend in use of public transportation. There is a tremendous need for this user service."

The following section, entitled Plan "C"', outlines one way that these mobility goals – but not the accessibility goals -- could be achieved.

PLAN "C"

Joel Garreau, the noted author of "Edge Cities", is also a reporter and editor for the Washington Post, a Research Fellow at both UC-Berkeley and George Mason University, and the author of other best sellers. He is one of the first media professionals to discuss the need to reinvent public transportation if we want to reduce the traffic congestion and mobility problems of the United States in a cost-effective manner.

Garreau's approach, which he calls "Plan C", uses new, low-cost, information technologies to do this. Specifically, Plan C utilizes palmtop computers (including some cell phones) and wireless data services to safely match qualified riders with qualified drivers in single-trip carpools (or "Smart Jitneys").

The Smart Jitney -- offers both the comfort and door-to-door convenience of a limousine or taxi and the low-cost and environmental benefits of a carpool. Some transit experts consider it to be the high-tech, door-to-door counterpart of the famous "slug lines" or "instant carpools" of Northern Virginia and California's East Bay, which safely transport thousands of commuters to work each day, at little or no cost to taxpayers.

Other transit experts consider it to be the high-tech, door-to-door counterpart of the jitneys of old, which flourished in U.S. cities before the development of the bus. Until the 1920s, affordable gasoline engines were just not powerful enough to move vehicles with large payloads (e.g. buses, big trucks).

JITNEYS

In 1914, privately owned Model T Fords cruised along trolley car lines in Los Angeles, picked up passengers waiting at the stops and, for a nickel, transported them to stops further down the line. For a slight additional charge, some of these jitney drivers would deviate from their main route to deliver passengers to their homes, particularly in inclement weather. The term "jitney" was a slang term for "five cents worth of anything" at the turn of the century.

In a period of just a few months, an estimated 900 jitneys were operating in Los Angeles and the idea quickly spread across the country. Within two years 62,000 jitneys were in operation throughout the United States. In fact, Seattle had over 500 jitneys, which carried approximately 50,000 passengers per day, without any government subsidies.

The popularity of these privately-owned jitneys was due to several factors - fewer stops, a more comfortable ride, and faster travel times than streetcars - at the same fare. Streetcar companies - which were often owned by electric utilities or suburban land developers - suffered considerably from the loss of revenue to jitneys. To cut these losses, streetcar company owners got laws passed to restrict jitney operations. By 1920, six years after their birth, jitneys were virtually extinct in the United States. Today, legal jitneys operate in only a few U.S. cities, but they are very popular overseas.

Garreau and others have pointed out, recent developments in palmtop computers and wireless communications services could make some types of jitneys popular in the U.S. once again. In fact, these technologies permit the development of low-cost Smart Jitney dispatching systems and low-cost, door-to-door transit services. Unlike the jitneys of old, moreover, the wireless-managed Smart Jitneys will only use inspected vehicles and insured and registered drivers to provide public transportation services. Last but not least, Smart Jitney drivers – who not only provide the vehicle and pay all operations and maintenance costs -- will be paid on a "piece-work" basis, probably based on the fares that are billed to passengers for their transportation services.

MINERVA- A SMART COMMUNITY SYSTEM

In order to reduce costs, improve both mobility and accessibility, and take advantage of the perceptive visions of the USDOT leaders who recognized the many benefits of building close ties between the IVHS/ITS program and the NII "Information Superhighway" program, the FTA employees and the personnel of state and local transportation agencies who managed the Smart Jitney study and design efforts insisted that the interactive dispatching function be made part of a multi-purpose, public-private "Smart Community" information system – later named MINERVA -- that would be used for both transportation and non-transportation applications.

The original business model for MINERVA was the French MINITEL information system. France spent many years and billions of dollars to develop its multi-purpose, public-private MINITEL system, years before the Personal Computer (PC) and the Internet became popular for ordinary people anywhere in the world. MINITEL created many new businesses, employment, education and other opportunities for residents of urban, suburban and rural areas throughout France in the 1980s.

Although it was developed with federal funds, users and advertisers paid all of the costs of operating and maintaining the nationwide French system, plus hundreds of millions of dollars a year in profits to the federal government and hundreds of millions of dollars a year in profits to the thousands of public and private organizations that developed software and information services for the MINITEL system For more information on MINITEL, consult the Internet or Reference 6.

The Smart Jitney/Community approach will help communities avoid some of the disadvantages of the German RufBus/FOCCS system which was dedicated to transit applications and required proprietary hardware for the dispatching terminals that were installed in each bus (including train), minibus and microbus (i.e. taxi) that was part of the transit fleet. Using mass produced, commercial-off-the-shelf (COTS) palmtop computers and some cell phones as the dispatching device for drivers and the calling device for passengers will also make it much easier to design, implement and deploy Smart Jitney systems.

The MINERVA III system utilizes Wireless Mesh Networks (WMNs) as its telecommunications infrastructure. "The major benefit of this emerging technology is that it enables anyone (or any vehicle) with a wireless adapter card in their palmtop, laptop, desktop or other computer to communicate on a peer-to-peer basis, in addition to accessing a WLAN….

"Mobile WMNs have been used by the military to establish temporary networks under battlefield conditions. They are also applicable to ad hoc applications by first responders, such as police, firefighters and EMS crews because they can be immediately established and the terminated when a mission is completed". (10) Consequently, Smart Jitney/Community systems could play an important role in Homeland Security applications in the future.

Like the MINITEL system in France, government agencies and private organizations will be encouraged to

utilize each community's mesh network to provide a wide range of new, wireless, information services (e.g. home shopping, tele-banking, electronic mail, video games, auto-instructional training courses, weekly report cards) to community residents. Advertisers and others who sponsor these information services will keep the cost of MINERVA low to both users and taxpayers.

MINERVA has been designed to improve the mobility and accessibility of residents of rural, suburban and urban communities, at a low-cost to both users and taxpayers. It will reduce important transportation, energy and environmental problems. It will also create a wide variety of new business, employment, education, recreation and other opportunities for local residents. Each MINERVA Smart Community system will be used to:

1. Manage a community's smart jitney operations, including dispatching. Smart Jitneys should be viewed as a new mode of transit – a low subsidy, door-to-door, route-deviation microbus service for corridors where conventional transit cannot be cost-effective..

2. Integrate smart jitneys with existing transit, paratransit and ridesharing modes to create more cost-effective public transportation system.

3. Facilitate new types of wireless traveler information services that will enable both riders and drivers to instantly find the best ways of getting between any two points in the region, based on the latest weather, construction, traffic, etc. data.

4. Integrate these new wireless traveler information services with other wireless information services (e.g. home-shopping, tele-banking, electronic mail, auto-instructional training courses, interactive games) to create more cost-effective community information systems and to reduce the need for some vehicle trips.

To obtain a smart jitney ride, most would-be riders will select the "Smart Jitney Ride Request" option from the "menu" that appears on the screen when they turn on their palmtop computers. They will then select the "Home to Senior Center", "Supermarket to Home", "Train Station to Work" or another pre-programmed trip option from the new menu on the screen. A message will automatically be sent to the MINERVA network and, after analyzing the options, a computer will dispatch a smart jitney minibus, van or automobile, a contract-taxi, or a transit agency dial-a-ride vehicle to pick them up, usually within 10 minutes. A description of the vehicle and the estimated arrival time will automatically be sent to the passenger's palmtop computer.

To offer a smart jitney ride, most would-be drivers will select the "Smart Jitney Ride Offer" option from the menu that appears when they turn on their palmtop computers, just before entering their vehicles. They will then select the "Home to Rail Station, "Work to Home", "School to Library", or other pre-programmed trip option from the new menu on the screen. A message will be automatically sent to the MINERVA system and, after analyzing the options, a computer will dispatch a smart jitney driver or a back-up transportation service to pick up and deliver the waiting passenger(s). The fare for the passenger will be the same for a ride on a smart jitney or on a back-up transportation vehicle (e.g., contract taxi, transit agency dial-a-ride vehicle). The name and address of the passenger and the estimated time of arrival will automatically be sent to the driver's palmtop computer.

Of course, the MINERVA computer will automatically check each would-be driver and each would-be rider before any trip match is made, to make sure they are eligible to use the smart jitney system. The MINERVA system will also permit drivers and riders to offer and request special (i.e., not pre-programmed) rides and identify any special requirements (e.g., wheelchair, walker, blind with "seeing-eye" dog, deaf). Palmtop computers and wireless Internet services will be "free" to Smart Jitney drivers and riders if they either provide or take at least ten (one-way) trips per month.

Under this concept, a driver who lives in one community and works in another could be recruited to provide smart jitney transportation services between these locations and intermediate points. The dispatching computer system would bill riders and pay drivers for their trips monthly. A part-time smart jitney driver should be able to earn at least $200 a month, providing comfortable and convenient transportation services to eligible neighbors and co-workers, while traveling to and from work or college. Smart jitney riders could save even more each month, if they eliminate the need for a second or third family car.

The use of the smart jitneys will extend the benefits of ridesharing to non-work, non-school trips. The smart jitneys will offer passengers the comfort and convenience of a taxi, and the low-cost and environmental benefits of a carpool. They will also offer drivers and riders an

opportunity to help improve the quality of life in their communities. Market research studies indicate that a smart jitney-enhanced public transportation system can significantly reduce traffic congestion, gasoline consumption, air pollution and mobility problems at a low cost to bot users and taxpayers.

CONCLUSIONS

Over the years, many transportation experts have pointed out that the traffic congestion, gasoline consumption, air pollution and mobility problems of the U.S. are not caused by a shortage of transportation resources. Most communities in the U.S. have enough transit vehicles and automobiles to handle their existing travel demands, "without even using the back seats of the automobiles". Most communities also have enough roadways and parking to handle all these multi-occupant vehicles (MOVs) without congestion.

Most communities in the U.S. also have enough automobiles and other transportation resources to provide good public transportation services for all their existing residents, including he poor, the aged and those with disabilities. The transportation-related problems of the U.S. are largely the result of not having the accessibility tools (i.e. a wireless information system) that will permit communities to manage their existing public and private transportation resources effectively, particularly in low-density areas and a low-travel times.

The MINERVA system addresses both of these issues. It views Smart Jitneys as a new mode of public transportation that must be integrated with other modes in order to be successful. The MINERVA system also views Smart Jitney dispatching as one application of a new, multipurpose, wireless information system that will improve accessibility for all residents. A variety of public and private sources, including advertisers, will pay for the costs of operating and maintaining this Smart Community system.

Once the Smart Jitney concept is proven in a few test locations, similar systems can be set up quickly throughout the United States and in other countries. The licensing fees from USDOT and its public-private partners who developed the core Smart Jitney/Community software should be quite modest. A small tax on basic telephone bills now finances most 9-1-1 systems in the United States. In the future, a small, dedicated tax on gasoline sales or highway travel (i.e. "road/congestion pricing" could be just another wireless-Internet application on the system) could finance the cost of installing the wireless infrastructure for most "Smart Jitney/Community" systems in the United States.

Just as the PTT's Electronic Phone Directory application served as the catalyst for building the multi-purpose French MINITEL System, Smart Jitney dispatching and could serve as the catalyst for building multi-purpose Smart Community Systems throughout the country. This Community Information Infrastructure (CII) program – a more formal name for a nationwide Smart Communities program –could greatly enhance the utility of the National Information Infrastructure (NII) program. The benefits for all citizens could match those of the Interstate Highways program, for a tiny fraction of the cost.

ABOUT THE AUTHORS

Robert W. Behnke has over 40 years experience in operations research, systems engineering and management consulting for clients in business, government and industry. He also taught Information Technology (IT) courses at the university level for several years, in both the U.S. and overseas.

The first half of his career was primarily focused on military command and control systems. In the 1960s, he served as a scientific advisor to the Commander-in-Chief of U.S. Forces in the Pacific (CINCPAC) and managed several contractor teams on classified computer and telecommunications projects.

The second half of his career was primarily focused on public transportation and community (including traveler) information systems. Mr. Behnke conducted studies on: (1) the cost-effectiveness of new U.S. and Canadian rail transit systems for the Governor of Hawaii, (2) the German Ruf-Bus/FOCCS Systems for FTA, Caltrans and Tri-Met, and (3) "Smart Jitney" and "Smart Community" systems for FHWA, FTA, several state and local government agencies, and private organizations.

Mr. Behnke obtained U.S. and Canadian patents on key features of the Smart Jitney concept.. He has a BA (physics and chemistry) from Hamilton College (Clinton, NY) and over 40 hours of graduate work in business administration, mathematics and system engineering at several universities.

He was a founding member of ITS-America and the Community Transportation Association of America.

Park Woodworth has 29 years experience in the transportation industry and is presently the Manager of Paratransit/Rideshare Operations for King County Metro Transit in Seattle, Washington. In that capacity he is responsible for a 280-vehicle paratransit operation and an 850-vehicle vanpool and vanshare program.

Prior to his Metro experience, Mr. Woodworth worked 16 years for TriMet in Portland, Oregon managing the paratransit program and ADA compliance for bus and light rail. He is also a private consultant regarding ADA compliance and transit technology.

Mr. Woodworth has a BA from Occidental College, an MS from Portland State University and a JD from Northwestern School of Law at Lewis and Clark College.

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NOTICE

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