Background Research on Kiosk Projects around the United States

Technical Memorandum # 1

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Background Research on

Kiosk Projects around the United States

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1.0 SCOPE

The scope of this study is to research interactive kiosk projects in the U.S. and Canada and make recommendations to the Metro-Dade MPO on the selection, user specifications, and installation locations of interactive kiosks in the Miami area. The kiosks have several purposes, including disseminating traffic/transportation information to the public and tourist alike, supplying timely tourist information to users, and providing feedback to transportation planners on proposed transportation projects. Therefore, research focused on potential, active, and discontinued interactive kiosk programs that had some of the characteristics listed above.

A background search on potential, active, and discontinued interactive kiosks projects was conducted through Internet and library searches. CUTR screened the project information and abstracts and selected kiosk projects that provide traffic/transportation or tourist information for further research. The project leaders of these selected projects were contacted to gather more information. The information gathered from reports, abstracts, and telephone interviews is compiled in this report. In two cases, CUTR researchers conducted site investigations and information gathered from these visits are included in this report. (A third site visit is planned prior to the end of the current contract; however, information provided by project evaluations has been included in this memorandum.)

1.1 INTRODUCTION

Severe congestion impedes personal mobility and economic development, as well as worsens the air quality and increases the consumption of additional energy resources. Many policy makers struggle to build their way out of congestion. However, due to scarcity of funding to build new highways and widen the existing roadways to meet the future demand, policy makers have to look for alternatives to minimize the congestion.

Two of the widely accepted solutions to congestion are to increase the number of people the transit system can carry without greatly increasing the number of passenger vehicles and to provide advance warning about congestion to drivers so that they can take alternate routes. Intelligent Transportation System (ITS) technologies can be used to provide timely information on traffic conditions and transit operations. Several cities across the country have tested interactive kiosks, as one of the many mediums, to disseminate this information.

Annually, more than eight million visitors come to Dade County, including a total of more than 525 business conventions which draw nearly 700,000 delegates who stay an average of three nights each and spend nearly $500 million. To make these stays more enjoyable and encourage return visits, transportation in and around the area should be made as convenient and easy as possible. Thus, interactive traveler information stations need to be developed and deployed in the area. Additionally, Miami would like to encourage visitors to extend their stay, and, therefore, tourist information should be readily available.

The interactive kiosk program will include a set of screens that illustrate the present transportation infrastructure and planned future developments, concepts, and projects. It will provide an option where residents can input their views on the various projects. Possible locations for these information stations include the cruise port, Miami International Airport, and the Turnpike service plazas.

This technical memorandum communicates the lessons learned from several interactive kiosks projects that disseminate traffic/transportation and tourist related information. Evaluation of each project provides more information on kiosks such as the type of information available, system (both hardware and software) problems, method of updating information, usage, etc. This memorandum examines both the positive and negative lessons learned, so that Metro-Dade MPO can build on these experiences to implement a successful kiosk project.

2.0 METHODOLOGY

Background research on existing kiosk projects started with searches through Internet and library databases. The search was limited to kiosk systems in the U.S. and Canada that disseminate information on transportation, traffic conditions, transit routes and schedules, and tourist information. Several databases provided a combination of well-known kiosk projects while few databases provided a more comprehensive kiosk projects including the proposed and discontinued projects. The following is a list of databases searched:

1. Yahoo, Infoseek, Lycos, Magellan, and Exite (World Wide Web search methods) - listed many kiosk sites and vendors across the globe that have installed kiosks
2. WorldCat - listed books and other materials related to kiosks in libraries worldwide
3. Engineering Index - listed engineering journal articles and reports related to kiosks
4. Procite - listed transportation articles and reports related to kiosks in CUTR Library
5. ERIC - listed general articles and reports related to kiosks
6. Dissertations Abstract - listed dissertations, since 1861 to present, related to kiosks around the world
7. General Academic - listed general academic literature related to kiosks
8. The Intelligent Transportation Infrastructure web site - listed many cities across the country that have installed or are planning to instal kiosks
9. NewsAbs - listed newspaper articles related to kiosks that appeared in news papers
10. TRIS - Transportation Research Information Service

Having thoroughly examined the literature gathered, it was reviewed for the kiosk projects that disseminated similar information as the planned Miami kiosk project. Project leaders of the reviewed kiosk projects were contacted for further information. These contacts provided a great deal of information, including additional contacts, and this information is summarized in this report.

3.0 RESEARCH FINDINGS

3.1 General

During the literature search, it was observed that providing real-time traffic/transit information to the public is a rapidly growing interest in many cities across the U.S. Several agencies have used interactive kiosks while other agencies have used the World Wide Web to disseminate this information. Many kiosk projects are funded through public agencies, and few kiosk projects are owned and operated directly by private companies. The private agencies transmitting the information have relied on advertising as the revenue source, while public agencies provided the service as part of informing the public to improve the traffic and transportation system.

Several kiosk projects were conducted as pilot programs to investigate the feasibility of interactive kiosks in disseminating traffic/transit information. The main problems facing the kiosks are the slow speed of the processor (when using 386 or 486 processors), software malfunctions, and printer difficulties. The kiosks that work with modems (14.4k bps or lower) reported information updating process as slow. Many project managers recommended using Pentium-based computers and Integrated Services Digital Network (ISDN) modem connections (if modem is the choice to update information). General recommendations are made in Section 4.

3.2 Specific Kiosk Projects

The following is a description of reviewed kiosk projects in the U.S. and Canada. It includes potential, active, and discontinued kiosk projects.

Atlanta Advanced Traveler Information System (ATIS) Kiosk Project

The Atlanta ATIS project includes more than 100 kiosks, the largest ever in the U.S., placed throughout Georgia with a high concentration in the Atlanta area. ATIS is maintained by

GeorgiaNet, a separate quasi-public agency created by the Georgia State Legislature. "GeorgiaNet is the state's on-line resource authority for all public, authorized information made available to the citizens of Georgia and the world."[1] Information available through this authority includes full-text of the current legislative session bills, motor vehicle records, and the Secretary of State's Corporation listing. Having this corporation affiliated with the kiosk project greatly widens the scope of possible information available on the kiosks in the future.

The Advanced Traffic Management System (ATMS) project of Georgia Department of Transportation and Georgia Travel Showcase system project of Federal Highway Administration provide necessary information to the kiosks through GeorgiaNet.

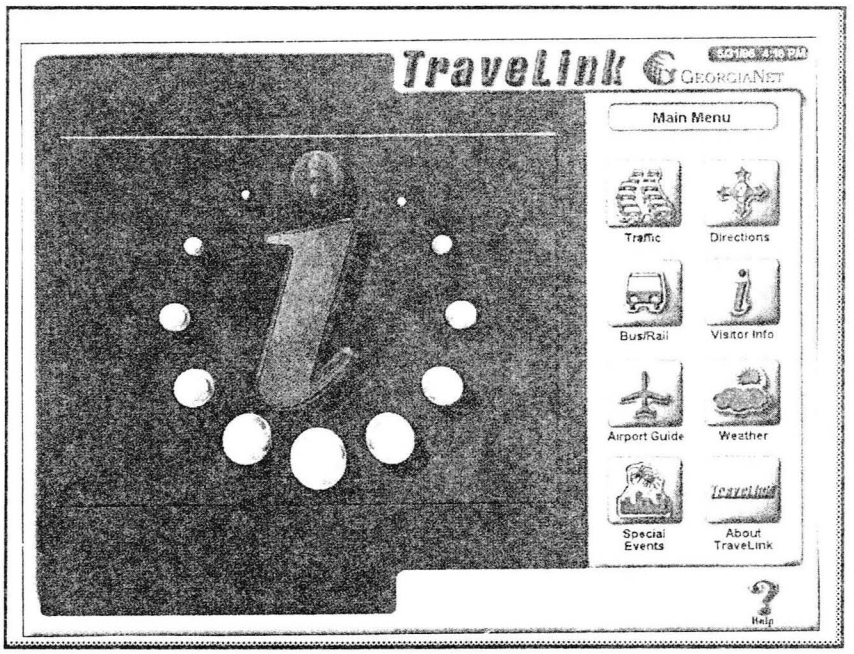


Figure 1: Opening Screen of the TraveLink Kiosk
Source: Informational brochure produced by GeorgiaNet

The kiosks are designed to provide the following information to daily commuters, non-work travelers, pass-through trips on the interstate, pedestrian traffic, and tourists:

- Real-time traffic conditions of the road network and highway speeds (information provided by ATMS)

- Real-time transit information (information provided by Metro Atlanta Rapid Transit Authority)
- Automatic route planning for Metro bus passengers and printing of route, schedule and fare information
- Special event information (e.g., Olympic events)
- Display and print ride-sharing information
- Weather conditions and forecasts
- Airline schedules and related information
- Atlanta and Georgia tourism information

The kiosks are installed in:

- MARTA stations
- interstate bus terminals
- commuter airports
- Olympic Village area
- major hospitals
- DOT rest areas
- state and local government office buildings
- Cobb Community transit station
- Hartsfield Airport
- major hotels
- the Olympic Games sites
- major shopping areas
- Welcome centers
- major Atlanta employment centers

GeorgiaNet owns and maintains the kiosks and is responsible for organizing the funding sources through various partnership with private agencies after the Summer '96 Olympics. JHK & Associates have designed the kiosks for the GeorgiaNet. The software used is called Authorware,

and an annual license fee is charged for its use. Base maps for the system were provided by NavTech. The weather information is supplied by the Weather Channel for a fee.

Georgia Tech Research Institute (GTRI) is leading an extensive evaluation of the ATIS. The most critical part of the evaluation will be user acceptance of the kiosks. GTRI will attempt to see what percentage of people passing by a kiosk will use it, how many found it useful, and how many plan to act on information received from the kiosk. This will be done by interviewing people on site (both during the Olympics and post-Olympics), and, to date, kiosk users have been very receptive to interviewers. Kiosks in rest areas along the highway have shown the most use. Information on kiosk use is also gathered continuously as all use is recorded at a central processor. Discussion was held whether to include an interview screen on the kiosk, but it was felt that too few people would use it without a significant incentive (for example, restaurant coupons printed by the kiosk printer). However, this incentive has the potential to greatly skew the results of the survey as people who simply want the coupon may spend their time randomly filling in multiple surveys.

Screen glare was found to be a problem at many of the kiosk sites. In one case, at Underground Atlanta, it was impossible to see the information on the kiosk screen if the sun was out. Another problem was fixing minor software glitches and printer jams. It was found to be very beneficial to have someone on site act as the maintenance person in charge of the kiosk. Placement location of the kiosks was also critical.

Two interesting features of these kiosks were a secret maintenance access code and a slot that can accept magnetic strip cards like a credit card or bank card. The maintenance code allows a person to exit the normal kiosk operating mode and access the software and setup part of the kiosk, including things like turning off all kiosk sounds. In the future, the kiosks may be used for a multitude of additional purposes, including some that will require payments. Therefore, it is necessary to include a place to insert credit or bank cards. GeorgiaNet may include many of its current services on the kiosks in the future.

Port Authority of New York and New Jersey Kiosk Project

Under this project, eight kiosks have been installed in the Kennedy International and LaGuardia airports in the New York metropolitan area. These kiosks provide information on the following:

- tourism information
- Hotels and restaurants
- Airport ground transportation
- Mass transit from the airport

Using an innovative contracting method, the Port Authority had the kiosks installed and maintained by the vendor free of charge. The vendor is also responsible for updating the information. The vendor receives advertising revenue to offset their costs. The large numbers of people passing by these kiosks made them very attractive to advertisers. Although this is, financially, an excellent deal for the port authority, they have had some difficulties with the vendor responding quickly to maintenance problems, possibly because the vendor is not paid directly by the Port Authority. Possible remedies include setting a specific "maximum downtime" in the contract to require the vendor to fix problems promptly and having the vendor's name prominently displayed on the kiosk.

Several recommendations resulted from the site visit to New York and the Port Authority, including:

- A disclaimer should be included when making trip recommendations to avoid potential liability.
- The kiosk needs to be eye-catching while clearly conveying its purpose to potential users.
- The kiosk needs to address and be designed to accommodate the Americans with Disabilities Act requirements.
- Ensure the vendor has sufficient funds to complete the project in cases where they are not funded by the initiating agency.
- The laser disk system created many problems -- it would be best to go with a large hard drive..
- The kiosk needs to respond quickly to user inputs.
- Drivers are interested in knowing how future construction projects will affect their commute.

The kiosks have been in operation since 1991 and are nearing the end of their contract. Near the beginning of the project there were theft problems but they have been overcome. The stainless steel case securely holds the equipment and is easily cleaned.

Los Angeles Smart Traveler Kiosks/California Smart Traveler Project

The Smart Traveler Kiosks project started in 1992 with three kiosks as a pilot project confined to Interstate-110 corridor in Los Angeles. This project was expanded to serve as emergency transportation information providers after the Northridge Earthquake that devastated the transportation infrasturcture. After this expansion, the number of kiosks in operation rose to 77.

The kiosks provided the following services:

- Los Angeles County Metropolitan Transportation Authority's transit routes, schedules, and fares information
- automatic route planning and itinerary printouts
- freeway traffic speed and freeway segment travel times
- ridesharing information
- videos on driving tips and the effects of transportation on the environment

The kiosks were installed in many different locations, including:

- Union Station (transit center in downtown L.A.)
- shopping malls
- grocery stores
- discount stores
- office buildings
- hospitals/libraries

The kiosks used laser disks to show the videos, printers to provide users with hard copies of transit routes and personalized itineraries, and modems to update the information. Specifically, IBM PS/2 486 computers were used with IBM 8516 touch screen monitors, Pioneer LDV-8000 laserdisk players, MagnaTek 40 column printers and 19.2 KBaud modems. The total cost for these items for all 77 kiosks are included in Table 1.

Table 1: Los Angeles Smart Traveler Kiosk Costs

Kiosk Cost Calculations	
Installation	
Software Purchases	$57,200.00
IBM Technical Assistance	$436,000.00
Kiosk Purchase Costs	$1,421,547.00

Kiosk Cost Calculations	
Kiosk Site Preparation/Negotiation Costs	$141,428.00
Phone Line Installation	$121,500.00
TOTAL INSTALLATION	**$2,177,674.00**
Operations	
Kiosk Maintenance	$217,792.00
Software Maintenance	$97,047.00
Supplies	$821.00
Dedicated Lines	$381,235.00
HWDC	$27,412.00
Annual Software License Fees	$90,800.00
TOTAL OPERATIONS	**$815,109.00**
Total Annual Cost Base on a 5-Year Life	$1,414,000.00

The total annual cost was examined over a five-year life cycle since this is the typical useful life of computer equipment. This equals $18,360 per kiosk annually. Estimates for the unit cost of installing fewer kiosks range up to $29,350 annually when installing 10 kiosks. These costs were high, even for the time period when they were installed, and now prices have dropped considerably. There were several cost cutting measures suggested in the evaluation report that would significantly reduce the cost of the kiosks. These measures included eliminating the multimedia (laser disk videos) capabilities and removing the modem and direct phone line link. Suggestions included using a CD ROM to store data instead.

Kiosk failures were also examined in depth. A failure here includes any event that results in all or part of a kiosk becoming inoperable, from the kiosk power source being turned off to a hardware malfunction. The kiosk failures from September 1994 to January 1995 were carefully monitored. The contract called for a 91 percent kiosk availability rate; during the project the kiosks attained

a 95 percent availability rate. The mean time between failures was 1.52 months, but this high rate was caused by a few problematic machines. The primary problem was power interruption to the kiosks. Many of the problems were solved by simply rebooting the machines and most repairs took less than one day. It was discovered that there is a direct correlation between the failure rate of the kiosks and their usage. However, failures were not correlated to days in operation or time in use.

Failures/Kiosk = 1.75 + 0.0493 *Average # uses per day

The major category of failure was "miscellaneous hardware/software problems," accounting for 25 percent of the total failures. More than half of these failures were rectified by rebooting the kiosk computer. The second major category was audio/video failure (at 21 percent). The screen getting stuck or "frozen" was the most common video failure, with rebooting the kiosk being the most common remedy. Surprisingly, loose or unplugged power plugs accounted for 18 percent of total failures. Moreover, turned-off power sources accounted for 13 percent of the total failures. The circuit problems amount to 9 percent of the failures while printer failures, with the printer running out of paper being the most common, amount to 8 percent of failures. Certain failure types were concentrated at a few sites. For instance, only 14 sites produced 20 circuit failures, and only 18 sites experienced 31 "power off" failures. More than 50 percent of kiosks did not experience a failure during the study period.

During this field test, the average kiosk was used 25 times per day, with a slight decrease in use over the length of the program. This was achieved without any advertising or marketing. The busiest kiosks were at Union Station and several shopping malls, the five least used kiosks included one at city hall, three in office buildings, and one in a grocery store. The average usage in office buildings was by far the lowest with only 5.4 uses per day.

Low usage at office locations is reasonable, for example, given the regularity of the commute trip. In addition, taking extra minutes to walk to the kiosk to check the freeway conditions map before leaving work is apparently not something most commuters are inclined to do. Conversely, tourists have a great need for travel information, hence the high usage of kiosks at Union Station and Burbank Airport. Our findings suggest that usage is a function of the level of demand for new trip information.[2]

However, the success of other traveler information programs that provide real time information over the Internet or cable TV would indicate users are interested in traffic data if it can be easily accessed from their office or home. One interesting finding was that there was a direct correlation between the percentage of users who choose Spanish and the average number of uses per day. As the percentage of Spanish speaking users rose, so did the number of transactions per day. The following tables indicate usage patterns for the L.A. kiosks.

Table 2: Group Means, Average Daily Usage by Location and Time of Week

	Shopping Center	Grocery Store	Discount Store	Office	Other
Weekend	50.60	22.77	52.97	5.40	19.70
	(32)	(16)	(12)	(42)	(44)
Weekday	39.06	16.13	37.44	20.70	25.52
	(80)	(40)	(30)	(110)	(115)

( ) = number of observations in each group

Source: Final report- Los Angeles Smart Traveler Field Operational Test Evaluation, University of Southern California, December 1995.

Table 3: Average Daily Usage of Menu Items

Command	Average Daily Use
Smart Traveler Introduction (entry screen)	25.78
Main Menu	25.31
How to use the kiosk	6.98
Current freeway conditions map	4.81
About Caltrans (video)	2.87
Rideshare/ carpool match listing	2.10
Ridesharing information (video)	1.33
Transit routes and schedules	5.08
MTA bus and train information	5.15

Source: Final report- Los Angeles Smart Traveler Field Operational Test Evaluation, University of Southern California, December 1995.

The menu system for both ridesharing and some transit routing options was considered "deep" (meaning there were many levels to go through to get to the end product). It was also necessary for users to type in street and location names for these options. Due to these two factors, the successful use of these options was small. Miami's kiosk should provide maps users can point to instead of having to type in words. One menu item users liked was that showing road closures, incidents, and delays.

The evaluation report reached five primary conclusions on kiosks:

1. Target the appropriate market -- the nonwork market.
2. Kiosks need to be marketed.
3. Establish on-site maintainers of the kiosk. Pay someone to regularly monitor the kiosks and take care of small problems as they occur.

4. Provide a set of informational services that are compatible. In L.A. real-time information was meshed with static. Recommendations were to use only static information such as transit information, movie theater listings, hours of operation of public agencies, etc.
5. Orient the kiosks to the novice, less sophisticated users.

Guidestar (Minneapolis, MN)

The Minnesota Travlink project was designed to encourage commuters to consider alternatives to single-occupant vehicle commutes, with the emphasis on public transit. The demonstration project focused on disseminating real-time transit and traffic information to users through computer on-line services, kiosks, electric signs, and display monitors. Travlink had three interactive kiosks which were strategically placed in downtown Minneapolis: one each at the Metropolitan Council Transit Operations (MCTO) Store, the Commuter Connection Office, and the Government Center Complex. These kiosks provided the following information:

Transit information

- How do I get to places of interest?
- Bus schedules and maps
- Real time bus location information
- Bus fare
- Park-and-Ride locations
- I-394 commuter services
- Special events
- Elderly and disabled services
- Bus service changes
- Customer service

Traffic information

- Incidents and delays
- Construction and maintenance

The kiosks provided tourist and traffic condition information besides transit information. During the trial period, kiosk use generally remained above 1,000 log-ons per month, with less use at the very beginning of the period. The Government Center kiosk received the highest average usage with approximately 20 uses per day, the transit store had an average of approximately 17 log-ons per day, and the commuter connection site average just less than 8 log-ons per day. Kiosk information was updated through modem connections.

A user survey conducted on kiosk users shows that men used kiosks (70 percent) more than women did. Of the surveyed uses, 65 percent found the kiosk easy to use, about 31 percent found it was somewhat easy to use, and only 4 percent did not find it easy to use. The most frequent by accessed screens were the schedules and maps screen, the "How do I get there?" screen, and incident and delay screen. The least frequently-accessed screen was the screen for elderly and disabled services. Many users wanted additional features, such as the ability to plan trips (How do I get from point "A" to point "B"?), or thought kiosks should be placed in more strategic locations (e.g., at downtown bus stops).

Travlink is a pilot project that was in operation from December 1994 to December 1995. The system is an integration of a computer-aided dispatch and Automatic Vehicle Location (AVL) system, an advanced traveler information system and an Automatic Vehicle Identification (AVI) system in the Interstate 394 corridor within the Minneapolis/St. Paul metropolitan area.

Riderlink, Seattle, Washington

Riderlink was designed to help employers meet the requirement of Washington State's Commute Trip Reduction law by providing easy-to-access information on a broad range of transportation options to encourage employees to try options other than commuting alone. Riderlink disseminated traffic/transit information through a World Wide Web (WWW) site and interactive kiosks. While

there are many other WWW sites maintained by other transit agencies, Riderlink may be the first to use the Internet to provide transit information to kiosks.

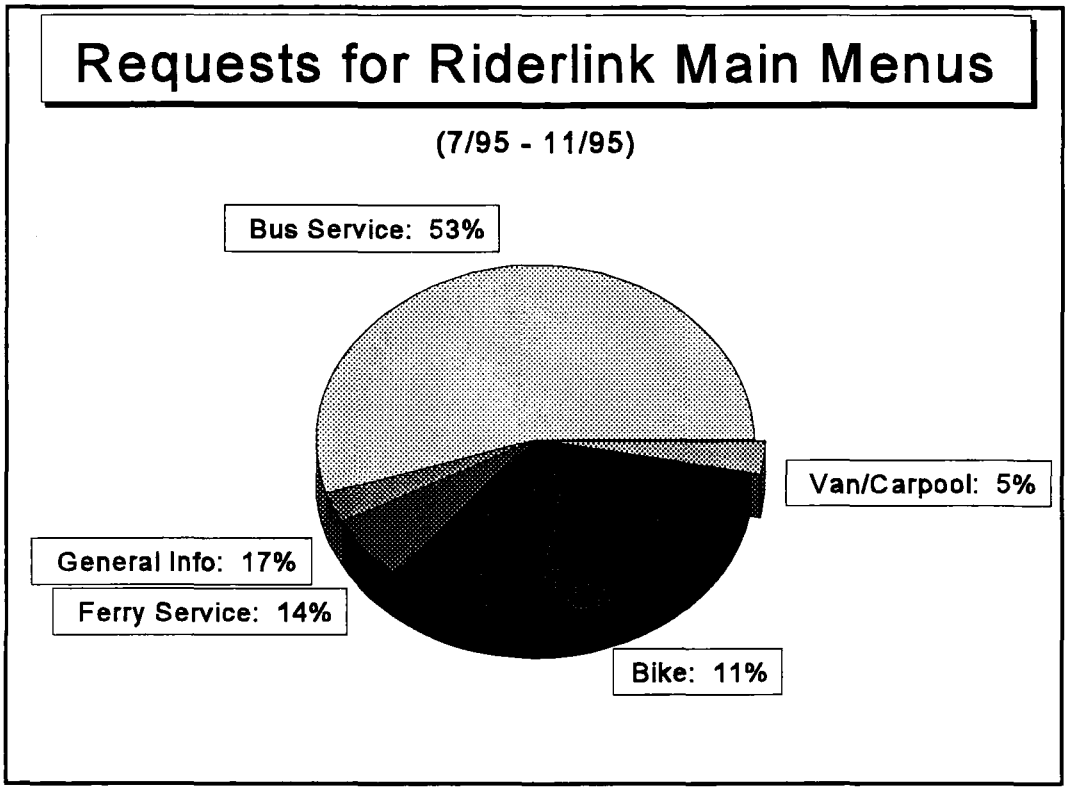
Riderlink kiosks receive all information from a host server that communicates with the Internet. ISDN connections are used to link these kiosks to the host. Due to the cost of having a continuous ISDN connection, the connection was only made after a user activated the kiosk, and the connection was lost after a specific period of inactivity. In-house software prohibits users from browsing the Web and they can get information from two Web sites -- the King County Ridestar site and the Washington State Department of Transportation (WSDOT) site. The kiosks were metal enclosures with a personal computer, touch screen, standard keyboard, and laser printer inside. Each kiosk cost just under $20,000.

Riderlink is a joint project between King County Metro and the Overlake Transportation Management Association (TMA), an organization made up of eight employers (1,500 employees) in a suburban office environment. The project was funded by King County Metro, the FHWA, and the Federal Transit Administration (FTA). Riderlink provides electronic access to ride-sharing and transit information and is designed to increase awareness of transportation options while encouraging employees to try commuting alternatives to single-passenger auto trips. The kiosks near the employee cafeterias were used, on average, only 10 times per month. This is not surprising as they are located where they are mainly accessed by persons with set commutes the employees who do not need alternate route or transit information. They are also in a less than ideal condition for those leaving work to check on freeway congestion. As with the Los Angeles kiosk program, kiosks located in office building are not nearly used to their full potential.

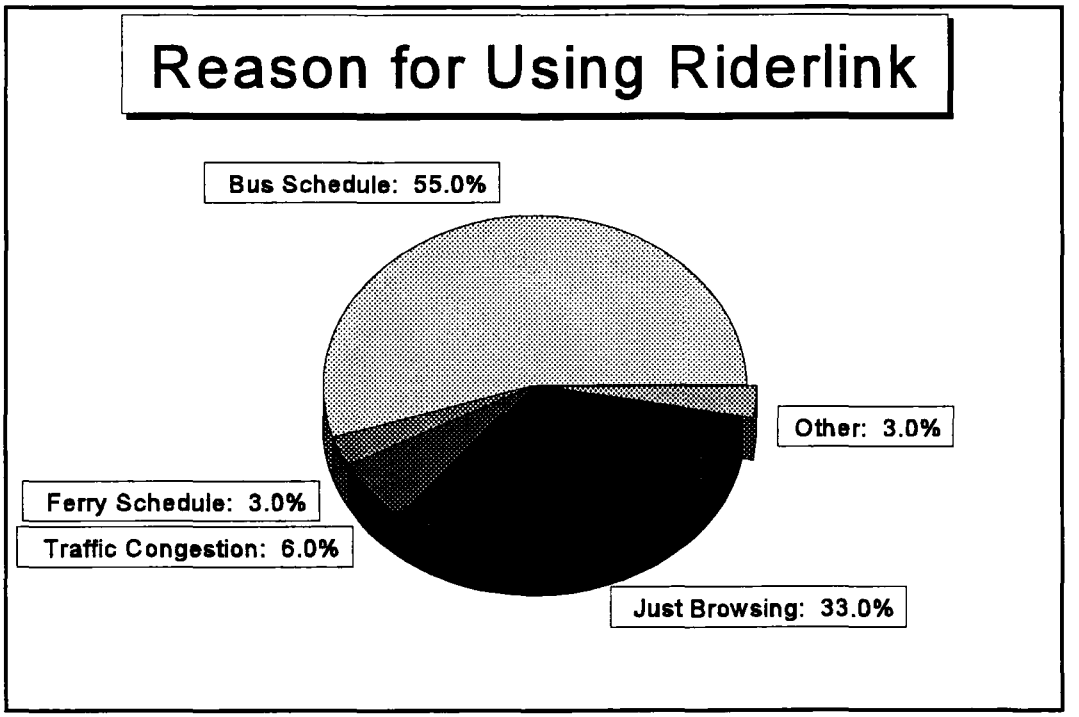
Riderlink was on-line on the Internet starting in December of 1994. Three kiosks were installed in May of 1995 near employee cafeterias in Nintendo, Unigard, and Group Health Eastside Hospital. A fourth kiosk was installed in the Metro Transit headquarters in the customer service counter area.

Information available on the WWW pages and the kiosks includes:

- Bus routes, schedules and fares for Metro services (on-line trip planning is performed, to provide route, schedule and fare information). Itineraries are electronically-mailed to users of this service.
- On-line ride-matching information for use by commuters. Carpooling possibilities are also electronically-mailed to users of this service.
- On-line forms to submit customer feedback to Metro
- Bicycling information (including Metro's Bike & Ride program)
- Ferry routes and schedules (from Washington State DOT)
- Freeway congestion information from WSDOT
- Road construction updates
- Other information about how to form carpools and vanpools
- On-line forms to submit user feedback on kiosks
- Other information on the sponsoring employers (kiosks only) and plans for public transportation in King County and Washington State



Source: Riderlink Demonstration Project Evaluation Report, King County Department of Transportation, February 1996



Source: Riderlink Demonstration Project Evaluation Report, King County Department of Transportation, February 1996

A user survey on Riderlink has revealed that it was accessed most often from home (56 percent) rather than from work (32 percent), school (7 percent), or kiosk (3 percent). By far, the kiosk in Metro Transit headquarters was the busiest (53 logons per month). Bus service information was the most accessed (53 percent) feature in Riderlink. The general information menu (including access to real-time traffic congestion information) was accessed by 17 percent, the ferry information was accessed by 14 percent, the bike menu was accessed by 11 percent, and the Vanpool/Carpool menu was access by mere 5 percent of users. Ninety five percent of computer-literate kiosk users indicated that the kiosk was generally easy or very easy to use and none of them found it difficult to use. However, of those who do not normally use computers, only 27 percent said the kiosk was generally easy to use, and 50 percent said it was difficult to use.

Table 4: Riderlink Features Most Accessed (July-November 1995)

Feature	Number of Times Accessed
Timetable Request Page	6872
Real-Time Freeway Congestion	2584
Bus Directions to Major Destinations	2448
How to use Riderlink	2152
Biking Resources	1855
Request for Bus Trip Planning	1686
Information About Metro Transit	1636
Bus Fares	1569
Information About the Overlake TMA	1496
Bike Racks on Buses Program	1414
Bus Tunnel Description	1470
News	1466
Metro Phone Numbers	1105
Ride Free Area Description	981
How to Ride the Bus	891
Riderlink Overview	741
Ridematch Application	582
Diamond Lane Information	570
How to Pay Bus Fare	569
Bus Directions to Transportation Centers	571

Source: Riderlink Demonstration Project Evaluation Report, Kings County Department of Transportation, February 1996

The major draw back of using a Web site to disseminate real-time information are the concerns of employers about Internet security (especially with the high-tech oriented companies). This has limited the ability widely to implement Riderlink at employer sites. In the short term, security concerns will continue to limit the use of the Internet in the workplace, and some companies will resist letting their employees have Internet access for fear that they will spend too much time "surfing." Another problem was that the kiosks required frequent rebooting (at least once a week per kiosk) to clear software errors.

Riverside County Transportation Network, California

Touch screen kiosks featuring full-motion color video, stereo sound, on-screen maps, personalized public transit itineraries, and carpool matches for commuters have been installed in the Coachella Valley area of Riverside County, California. This pilot project, called TransAction Network, has four kiosks at shopping centers with high pedestrian traffic.

Commuter Transportation Services Inc. and SunLine Transit Agency introduced the TransAction Network, and IBM and North Communications developed the network system. The kiosks provide the public with a one-stop source of a variety of information in English or Spanish.

The following information was available to users through five screen options:

- Carpool Service
- Route Service
- SunBus Maps and Videos
- Rideshare Videos
- Kiosk Help

The users receive a free printout of a complete SunBus itinerary which includes route, bus stop, fare, and schedule by entering the destination, arrival or departure time. The itinerary also includes a

carpool match list that identified people who live and work nearby and were available to carpool. To promote kiosk and transit usage, the kiosk users receive a free bus ticket good for one ride with each itinerary printout.

Fairfax County, Virginia

Fairfax County is implementing a kiosk system to provide static transit and other transportation related information on kiosks in two regional libraries.

The system first displays a map with regional divisions. The user touches any of these areas on the screen to zoom in on that particular area, which is then overlaid with a map of major roads. Static information is then presented on public transportation, bus/rail systems, rail systems, van pools, parking and bike trail information.

The user can choose the following screens:

- Transportation Information
- Using Library
- Living in Fairfax County
- Auto Registration Information
- Trash Pickup Schedules
- Exploring Fairfax County

A telephone is attached to the kiosk for getting help in kiosk use. The kiosk project is sponsored and funded totally by Fairfax County. The George Mason University Labs implemented the system. The Redmon Group, Inc., acted as the subcontractor.

TranStar, Houston, Texas

As a part of Houston TranStar's on-going effort to disseminate traffic and transit information to the Houston traveling public, a pilot program is being launched to determine if interactive, multi-media, electronic kiosks are an effective medium for this purpose. Specifically, the Texas Department of Transportation (TxDOT), the Metropolitan Transit Authority of Harris County (METRO) and the City of Houston are cooperating in the deployment of electronic kiosks at up to 20 Houston locations. These kiosks will present the latest available information on roadway traffic conditions and METRO bus system routes, schedules and fares. A demonstration kiosk (not part of the mainstream pilot program) will also be installed at Houston TranStar. Information from the kiosks will enable both motorists and bus riders to revise short-term and long-term commuting and travel plans to avoid congestion and shorten travel times.

Denver, Colorado

A multimodal transfer center with kiosks was proposed to provide real-time or near real-time information to travelers. The transfer center was planned to be constructed near I-70 near the western edge of the metro area for travelers bound for the rural recreational areas west of Denver as well as downtown Denver. According to the project manager, due to the citizen complaints on the location of multimodal transfer center and other internal project conflicts in Colorado DOT, the project never got started and is presumed abandoned.

Go-Time, Halifax, Nova Scotia

The Halifax Metro Transit has 14 video display kiosks, 14 speaker phone, and 4 auto-dial telephones (with direct connections to an information center) located throughout greater Halifax. All kiosks provide bus information in real-time from a host server that is automatically updated when changes

in the AVL occur. Transit information consists only of arrival times for the next two buses at any given location. Kiosks are non-interactive in the sense that *no user input is required by the kiosk.*

The project manager for the Go-Time kiosks says the Halifax system was the first AVL application implemented by a transit system in North America. The AVL system is used within Metro for scheduling and operations. Kiosks, which are only a part of the larger system, are installed in transit center shelters and shopping malls. There are two types of kiosks. Those in transit centers present only transit information (i.e., arrival times for the next two buses) with no interaction from users. Kiosks in shopping malls required the input of a four-digit codes denoting the nearest bus-stop. Those in shopping malls display the same transit information on the top half the screen, and advertising/security information or messages from Metro on the bottom half. Shopping center kiosks are located next to the information/security booths.

For future deployment of kiosks, Metro Halifax is considering student union buildings on university campuses, more shopping malls and major office buildings in the central business district.

Accutraffic System, Houston, TX

This is an example of a private organization transmitting traffic conditions to public through kiosks. AccuTraffic is a private organization involved in providing traffic information on four kiosks in the downtown Houston area. AccuTraffic also sells traffic information to radio and TV stations and has a World Wide Web site that displays traffic information. AccuTraffic generates revenue from advertising messages on the webpage.

The AccuTraffic accesses TranStar information for freeway maps. This information is augmented by text displays above the map, detailing information on incidents, road conditions, and traffic problems anywhere in the city. Information on incidents, blockages, flooding, construction, etc. is gathered by an operator who monitors several radio scanners that report traffic incidents. The

operator has many contacts within the police department as well as within TxDOT, Metro and TranStar.

The network for displaying the TranStar information is composed of both wireless communications and dedicated telephone lines. A server is located downtown for transmitting traffic information to the kiosks. Information on the server is refreshed at two-minute intervals. Web information is refreshed every 90 seconds. ISDN connections are being used for server-to-kiosk communications.

Table 5: Kiosk Project Contacts in USA & Canada

Project Name/Location	Project Status	Contact Person/Site
Virginia/George Mason University	in operation	Keith Sinclair, FHWA, GA (404) 347-3039
"TraveLink", Georgia	in operation	Todd Long, Georgia DOT Traffic operations (404) 651-8475
New York City	RFP released	Mr. Issaac Takyi, New York City Transit Authority (718) 694-1777
Denver, CO	not started (doubt if it will be implemented)	Debra Angulski, Colorado DOT (303) 757-9111
"Smart Traveler", Los Angeles	pilot project, discontinued	Cliff Loveland, CalTrans (916) 654-9970
"Travlink", Minneapolis/St. Paul	pilot project, discontinued	Marilyn Remer MinnDOT (612) 582-1601
Riverside County, CA	pilot project, discontinued	Anne Durnburg, Sunline Transit Agency (619) 360-5311
Baltimore, Maryland	under development (no kiosks)	Mass Transit Administration (410) 333-3541
"Go Time," Halifax, Nova Scotia	in operation	Moss Mombourquett, Halifax Metro Transit, Nova Scotia (902) 421-2647
Tucson, Arizona	under construction	Heral Ramsey, Sun Tran Administration (520) 623-4301 / 792-9222
Corpus Christi, TX	in operation (TV monitors, no kiosks)	Dianne Garcia, Corpus Christi Regional Transportation Authority, (512) 289-2600

Houston, TX	planning	Wayne Holcombe, Traffic Engineers, Inc. (713) 270-8145
TravInfo/ San Francisco, CA	transit, travel option	Y. B. Yim, PATH (510) 642-3585
The Port Authority of NY & NJ	in operation	Joann Breslin, The Port Authority of NY & NJ (212) 435-4874
Riderlink, Seattle	in operation, reduced the number of kiosks to one	Catherine Bradshaw, King County Metro, Seattle, WA (206) 684-1770
Richmond, VA	in consideration	Rollo Axton, Greater Richmond Transit Co. (804) 358-3871
"Accutraffic," Houston	in operation	Doug McLane, AccuTraffic Inc. (713) 750-7750
Columbus, OH	RFP will be released	George Saylor, Ohio DOT (614) 752-8099

Table 6: Kiosk Vendor Contact List & Information

Name & Phone Number	Address	Experience	Equipment Used & Cost
TravelNet (Div. of JMS Systems, Inc.) (800) 370-3009	418 E. Broadway, Suite 25 Bismarck, ND 58501	Owns & operates a kiosk system providing road surface condition (icy, wet, snow etc.)	
IBM 800 4-A-KIOSK	1600 RiverEdge Pkwy Atlanta, GA 30328-2015	Los Angeles Smart Traveler kiosks	IBM PS/2 computer, 1.4GB, M-motion video adapter/A, communications adapter cable, M-audio capture / playback adp/A, Multi-protocol adp/A, PS/2 4MB RAM, ATIOS components, mouse, IBM space saver keyboard - $18,150
Kiosk Information Systems, Inc. (303) 466-KISI	2745 Industrial Ln., Unit 101 Broomfield, CO 80020	Hardware design. Worked for IBM, Unisys, Disney, US West, Rubbermaid, Data General, State of Georgia, NREL, US Dept. Of Energy, Oldsmobile, Pacer Cats and Saturn Autos	
North Communications (310) 577-7700	13274 Fiji Way, 6th Floor Marina Del Rey, CA 90292	Quick Court Kiosks in Salt Lake City, Utah; Texas Credit Union Electronic Banking Kiosks; CityAccess Kiosks, NY, NY; "Tempe in Touch Kiosks," Tempe, Arizona	
Digital Interactive Corporation (516) 567-5550	61 Keyland Court Bohemia, NY 11716		
Quick ATM Corporation (510) 883-0400	2437 Durant Ave., Suite 206 Berkeley, CA 94704	Airport kiosks in NY/NJ, Washington DC, Los Angeles	
Interaction Media Corporation 800 474-4410	1701 Poncedeleon Blvd. Coral Gables, FL 33134	IKE in USF Marshal Center, FUI North, Univ. Miami, West Virginia Univ., North Western Uni., Rhode Island Univ.	Typical Pentium with communication hardware ($7000-10,000)

4.0 FINDINGS APPLICABLE TO METRO-DADE

Findings from the various kiosk projects examined that are applicable to Metro-Dade kiosk project are outlined in this section. Through extensive research, it was found that only a few projects accurately and extensively documented the success and failure of their projects. The following findings were identified as directly applicable to Metro-Dade kiosk project:

- Funding
- Communication
- Information presentation
- Kiosk failure
- Maintenance
- Kiosk usage levels

Not surprisingly, funding was often mentioned as critical to the project's success. Lack of funding led to the system shutdown of the Riverside County TransAction program since no provision was made for operating the system between the end of the pilot program and the completion of evaluation.

Communication between kiosks and the central location, where the updated traffic/transit information is transmitted from, played a vital role in the success of kiosks. The cost of dedicated telephone lines used in Smart Traveler project had posed a major problem and CalTrans was even considering the Internet as a communication medium for providing Smart Traveler system function to PC users. However, RiderLink held the opposite view with using Internet in this regard. In particular, at times when Internet usage is high, failure in one component can cause the communications link to freeze for other users. Solving this problem requires rebooting individual stations including kiosks that are linked to the Internet. Several project managers strongly suggested that Metro-Dade consider the ISDN, the fastest communication connection the current technology offers, for communication links. The problem with slow communication links is that kiosk users will not tolerate a slow response while a file is downloaded to the kiosk.

Low kiosk usage may have been attributed, in part, to the method of information presentation in kiosks. A user survey conducted on Guidestar and Riderlink projects indicated that the kiosk information was difficult to understand. However, most of those who had trouble interpreting and using kiosks were not computer literate. Some uses revealed that traffic maps in Smart Traveler system were very busy and difficult for users to understand. During a TranStar survey, an interviewee had indicated that the map was developed for use by experienced traffic managers, not for use by the "man on the street."

Another critical factor in level of kiosk usage is the location of the kiosks. Office building locations often received the lowest amount of usage. This is likely because most travel to and from the office is a fixed, regular event. There is no need on the part of the commuter to gather a great deal more information on this commute. Kiosks must also be located where they will be seen, and not hidden away in some remote corner of a building. The selection of kiosk location must be chosen carefully in order to avoid screen glare. In some instances, this glare can render the kiosk impossible to use.

Kiosk failures are well documented for Smart Traveler project. Top four kiosk failures included hardware/software problems, audio/video problems, power plug loose or unplugged, and power source turned off. Failure related to power plug or source amounted to about 31 percent of failures. Hardware/software and audio/video problems were often solved by simply rebooting the kiosk computer.

Maintenance played a vital role in keeping kiosks up and running. The kiosk systems, especially those with printers, had reported considerable maintenance requirements. Riderlink and New York/ New Jersey Port Authority kiosks projects could require sending maintenance crews up to once a week to each kiosk location. The maintenance work included clearing paper jams and adding paper to the printers. The New York/ New Jersey Port Authority and Minnesota Guidestar reported having communication software problems and were remedied by new software versions. Riderlink and Guidestar project experienced problems of adding new route maps and changes to existing route maps.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Throughout this report, recommendations gathered from the various kiosk projects across the county are listed. This section compiles and lists the most critical of these recommendations. This list should be used when developing a RFP or RFI for the Metro-Dade kiosks.

List of Recommendations:

1) The kiosk needs to be eye-catching while clearly conveying its purpose to potential users.
2) Pentium-based computers with large hard drives (2 GBytes or larger) and preferably 16 MBytes of RAM or more should be used.
3) Integrated Services Digital Network (ISDN) modem connections (if modem is the choice to update information) should be used to ensure adaquate information refresh rate.
4) All static information possible should be stored on the kiosk hard drive. The minimum possible amount of information (i.e., only real-time information) should be stored.
5) A secret method to access the kiosk software should be included, and the kiosk attributes (sound for example) and maintenance should be performed on the kiosk, possibly by touching the screen in a certain location and punching in an access code.
6) Inclusion of slot that can accept magnetic strip cards like a credit card or bank card for future applications should be considered, allowing for a more versatile kiosk.
7) The kiosk needs to address and be designed to accommodate the Americans with Disabilities Act requirements.
8) The kiosks should be oriented toward the novice, less sophisticated users. No menu selections should be too "deep" and maps instead of written words to indicate locations should be used.
9) A disclaimer should be included when making trip recommendations to avoid potential liability.

10) The vendor should have sufficient funds to complete the project in the case where they are not funded by the initiating agency. Not surprisingly, funding was often mentioned as critical to the project's success when the public agency provided the funding as well
11) The location of the kiosk should be chosen carefully and based on several factors. Other kiosk projects clearly show kiosks get more usage at large transit stops, airports, rest stops, etc., NOT at businesses. Target the appropriate market -- the nonwork market. Be careful of screen glare and try to get the kiosk placed in an obvious, high traffic location -- not shoved into a out of the way corner.
12) On-site maintainers of the kiosk should be established to regularly monitor the kiosks and minor software glitches and printer jams should be addressed as they occur.
13) Due to the similarities between kiosk programming/use and Internet programming/use, Metro-Dade should develop their kiosk software to work in both mediums. In this manner, many more people will have access to the information when Metro-Dade establishes a Net presence.

During this research, CUTR also received a great deal of information on what the kiosk screens should look like, how they should work, and things to avoid. This aspect of the kiosks will be further studied and results will be presented in the next technical memorandum. However, the recommendations in this first report are a significant start to clearly defining the Metro-Dade's eventual kiosk system.

Endnotes

[1]"GeorgiaNet: Questions and Answers", GeorgiaNet, 1996

[2]G. Giuliano et al., *Los Angeles Smart Traveler Field Operational Test Evaluation*, California PATH Research Report, University of Southern California, UCB-ITS-PRR-95-41, December 1995, p. 4.

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