Transportation demand management (TDM) strategies are designed to motivate people to modify their travel choices, particularly the drive-alone preference. TDM strategies and policies seek to increase transportation system efficiency and achieve specific objectives, such as reduced traffic congestion, road and parking cost savings, increased safety, improved mobility for non-drivers, energy conservation, and pollution emission reductions. Marketing these strategies to the “consumer” in an effective way that results in behavioral changes requires a sustained understanding of how, when, where, and why people travel. Therefore, accurate, timely, and comprehensive data are vital in understanding/influencing consumer behavior. The same data are essential for many planning purposes including future demand assessments and long-range transportation plans.

Through a project sponsored by the Florida Department of Transportation (FDOT), CUTR is conducting a study to design, implement, and test TRAC-IT, a software architecture for GPS-enabled mobile phones that enables both passive and active travel behavior data collection while also supporting real-time location-based services that benefit the end-user. The resulting system presents a unique opportunity to collect high-resolution individual travel behavior data that are instantly transferred to a server for analysis by transportation professionals, while giving the user a direct incentive for continuing to participate in long-term travel surveys.

Data Collection Challenges and GPS

There is increased emphasis on maximizing the efficiency of the transportation systems by means other than adding lanes such as applying new technology and demand management approaches. Demand

continued on p.2
management strategies seek to provide more choices to travelers to encourage them to change, for example, their mode choice from driving alone to ridesharing, transit, walking or biking. Other choices include making trips during off-peak hours, changing routes, or eliminating work trips by teleworking, for example. Marketing these strategies to the “consumer” in an effective way that results in behavioral changes requires accurate, timely, and comprehensive data. Traditional paper and/or telephone surveys consume time and labor that are subject to human error and do not provide the desired levels of accuracy. These surveys also place a burden on participants, which results in incomplete surveys or eliminates a section of the population that now depend on mobile phones instead of landlines.

Data collection processes in recent years have made use of new, emerging technologies that help refine the task of monitoring and measuring the behavior to be modified. GPS technology is proving to be an excellent means of passively recording the time of travel and path of the participant while requiring little or no interaction with the user.

Several past pilot travel surveys have used vehicle-based GPS units because of the battery life and portability limitations of dedicated GPS devices. These devices provided a detailed log of vehicle movements but are unable to record trips taken by the user for bus, carpool, biking, and walking trips and are unable to distinguish one user from another. Also, additional information about trips may be desired that is not easily extracted from GPS data, such as trip purpose, mode of transportation, and vehicle occupancy. This information must be actively collected from the user. Therefore, a mobile device is preferred as a survey instrument that not only records GPS data for one individual but also can record active input from the user to collect additional information.

The convergence of market demand, technology advances, and regulatory requirements have created an opportunity for using cell phones as a data collection tool and also a new means for low-cost delivery of traveler information and services. The federal E911 mandate hastened the creation of GPS-enabled mobile phones with integrated GPS chips to determine the user’s position quickly and with a high degree of accuracy. Additionally, since mobile phones have an “always-on” wireless data connection, real-time services can be delivered to the user. The cellular network also provides a secondary source of position information if GPS is not available.

The TRAC-IT project is a software infrastructure that enables a commercially-available GPS-enabled mobile phone to be used as an active or passive travel behavior data collection device. A Java Micro Edition (Java ME) application runs on-board the mobile device and is able to prompt the user for active survey input and automatically interrelate that data with passively-collected assisted GPS data from the phone. TRAC-IT is also designed to simultaneously deliver to the user information such as real-time traffic alerts based on the user’s real-time and historical locations while collecting travel behavior data, providing an incentive for continued participation in extended travel surveys.

Two primary methods of utilizing mobile phones are employed to obtain travel information: (1) using cellular signaling data to estimate average speed or travel time on road segments, and (2) using positioning technologies such as GPS to determine the precise location of each individual mobile phone that is being examined. Each yields different types of information that can be used for different purposes.

The first method uses anonymous cellular signaling data gathered at cell towers to estimate travel time on nearby
highways. This technique works by looking at where and when signal handoffs occur when the cell phone travels from one tower’s coverage area to another. Travel time and estimated travel speed on a specific road segment are the only items of information available from these types of systems, which may be sufficient for traffic operations. However, travel path, individual travel behavior, and origin and destination information are not available from this method of data collection.

The second method is the use of GPS-enabled mobile phones to gather continuous position data for each mobile phone, including speed and heading data. TRAC-IT uses this method to calculate the phone’s position using GPS, network triangulation, or a similar positioning technology. GPS is highly accurate, with most position calculations being accurate within 3 to 30 meters and speeds shown to be accurate within 0.2 meters/sec in past studies. GPS fixes can be collected with a frequency of up to once per second for each mobile phone, thereby generating a wealth of information of an individual’s travel behavior. This method yields origin-destination data as well as travel path information for each individual traveler and is a modern version of the traditional activity diary. Travel speeds and estimated travel times can also be extracted from these data from multiple phones. The proliferation of mobile phones in the market place could potentially eliminate the equipment cost for survey deployment, while the device’s portability allows it to track travel behavior by any mode.

While GPS-enabled mobile phones are a promising source of data, transportation professionals must overcome several challenges when designing and deploying such a method. First, a software infrastructure that spans both the mobile device and a server must be designed and implemented. There can be adverse effects on handset performance, such as battery life or the ability to receive incoming phone calls if the position requests are not efficiently managed by the software running on the phone. Additionally, users must opt-in to install the software application on their phone. Incentives may be required, such as providing the user access to real-time traffic information alerts based on current location. The TRAC-IT project examines this method of data collection and evaluates a prototype architecture that implements such a method.

**Research Methodology and Field Tests**

The research focused on the development of a widely-deployable mobile software application for commercially-available, GPS-enabled mobile phones to support next generation travel surveys, real-time traveler information dissemination, and travel behavior change techniques. The TRAC-IT architecture is also supported by a server application developed to receive and store data collected by the mobile application.

Fourteen volunteers participated in the TRAC-IT mobile phone field tests. The TRAC-IT application was set in active mode so it would record GPS data only when the participant selected starting a trip via the user interface. TRAC-IT was set to query the GPS position of the phone every four seconds and send this information to the server during trip recording. To maximize the amount of GPS data available for analysis, both the location-aware State machine and critical point algorithms were turned off for the field tests as extensive testing of those software modules was not possible before deployment. (See accompanying article for information on TRAC-IT system architecture.)

Volunteers were asked to carry their cell phones around for two to three weeks and were reminded to charge the phone battery nightly. Participants were given instructions regarding the user interface and were encouraged to enter their trips during the course of daily activities. No specific instructions were given to the user for where to position the phone during trip recording.
For each trip recorded using TRAC-IT, participants were emailed trip data that included a description based upon their use of the TRAC-IT interface, as well as a graphical representation of each trip. Participants who used Microsoft Outlook were emailed their trip information in the form of calendar entry so the time of the trip could be visualized along with their other appointments. Additionally, participants could easily accept or reject the information as an appropriate representation of their actual travel behavior and provide comments back to the research team by replying to the message.

Results

During the initial phase of field testing for TRAC-IT, 317 trips were recorded by 14 volunteers spread out over a period of three months, resulting in the collection of 66,523 location data points. Of these location data, 53,290 data points represented GPS data points with an associated latitude and longitude and estimated accuracy. The remaining 13,233 location points represent the location of the cell tower the phone was communicating with when a GPS fix was not possible. The location of the subjects’ activity was primarily in the University of South Florida area of Tampa, although some trips were recorded in Seattle, Fort Lauderdale, and Orlando to test TRAC-IT in other geographic locations. A variety of modes were utilized, including walking, bus, car, and bike.

Of the 317 trip segments recorded by the participants, only 7 of the resulting records were reported by participants as an inaccurate assessment of travel behavior. Five of these appeared to be errors in user input via the phone user-interface when labeling locations. In the other two cases, the GPS reception faded near the ending location, and therefore it appeared on the map that the ending location was earlier in the trip.

Conclusion

The use of GPS-enabled mobile phones and an application such as TRAC-IT present a unique opportunity to collect high-resolution travel behavior data for individuals and households. These data represent an improvement over traditional OD data, since GPS data accurately represent the path of travel and additional user input can be collected through the survey in the user interface. TRAC-IT uses actual positioning technologies such as GPS, not just aggregated cell signaling data, to yield extremely precise position data, often within 3-5 meters of the true position, for each time point that is captured with a supported frequency of up to one fix per second. The use of handset-initiated GPS requests allows the simultaneous delivery of real-time location-based services, such as those provided by the Path Prediction algorithm, to the user and therefore provides a direct incentive for the user to participate in a survey for an extended amount of time.

For more information on the TRAC-IT project, contact CUTR Research Associate Sean Barbeau, barbeau@cutr.usf.edu, (813) 974-7208.
The general architecture that supports TRAC-IT is shown in the accompanying figure. The mobile phone runs the client-side application software that incorporates the user interface as well as the methods for obtaining user position information. The cellular data network and the Internet are utilized as transport networks for data sent between a mobile phone and a web application server. The cellular network can also be used to provide user position information through cell signal triangulation or Cell-ID of the base station if GPS is unavailable. The server-side component is responsible for managing interactions with the mobile phone and contains the database holding user and trip data generated by the client application.

Various components were developed to improve users’ utility of TRAC-IT and to minimize the burden on the user, as summarized below.

**Location-Aware State Machine:** In the mobile Java ME application, TRAC-IT utilizes a location-aware State machine to regulate the rate at which position information is requested from the GPS hardware to save battery energy during constant tracking. The State machine also supports the functionality of “snapping back” (i.e., “waking up”) to the most frequent polling rate when location GPS fix with a speed above a threshold is obtained. TRAC-IT utilizes this functionality, since applications such as TRAC-IT should begin tracking at a rapid rate as soon as the user is discovered to be traveling.

**“Critical Point” Algorithm:** This algorithm was developed to save battery energy by reducing the transmission of unnecessary location data to the server. When GPS data are recorded frequently by the mobile phone, a large amount of data that are not necessary to reconstruct a participant’s trip is generated, such as GPS points collected when the phone is not moving or multiple GPS points that create a straight line. The data that are needed to reconstruct a user’s travel path are referred to as “critical points.”

**Smart Graphical User Interface Design:** Active survey input is accomplished through a user interface. A series of screens collects location descriptions, mode, purpose, and occupancy data. This information is automatically related to GPS data collected simultaneously,
thereby giving a complete representation of the user’s travel behavior. The user interface can also implement intelligent methods, such as pre-filling fields based on real-time or historical travel behavior, to further reduce the burden on participants during the active survey. If desired, TRAC-IT is also able to collect data in a passive mode where no user input is required and only GPS data is collected.

The server-side module of TRAC-IT is responsible for receiving, analyzing, and providing feedback for travel data transmitted by the mobile phone. It consists of two main software elements: an application server that deals with communication and analysis and a database server that deals with storage and retrieval of trip information. Since TRAC-IT is a distributed application between the mobile phone and server, an application server must manage all interactions between the database and the mobile phone.

Path Prediction Algorithm:
This algorithm was developed to support real-time traffic incident information delivery to the mobile phone that the user may encounter along the path he/she is traveling. It is accomplished by predicting the user’s immediate route in real-time based on past travel behavior and the user’s real-time position and then scanning ahead on each potential route to determine if any incidents lie along the predicted path. If an incident is detected, the user can be alerted via text or multimedia message. This service provides the user with a direct incentive to continue to use TRAC-IT to record his/her travel behavior, since alerts will be received only if the TRAC-IT mobile application is running on his/her phone and he/she has recorded travel behavior in the past.

Purpose detection algorithm: To reduce the need for manual user input, the purpose detection algorithm was developed that uses GIS-based Department of Revenue tax classifications of land parcels and GPS data from the ending points of trips to derive a traveler’s trip purpose. By determining the classified land use where the user ended their trip (e.g., restaurant), the algorithm is able to provide an estimate of the individual’s purpose for visiting that location (e.g., eat at restaurant).

Mode detection algorithm: Similar to the purpose detection algorithm, the mode detection algorithm was developed and is implemented through the use of a neural network. The data from known bus, walking, and car trips are provided as input for the neural network, and the common characteristics of these records are then extracted and generalized for later comparison against data sets of unknown mode type. Trips with a sufficiently high degree of similarity with the training set of trips are considered to be of the same transportation mode. Field tests to date have yielded a total accuracy of this method approaching 92 percent for all modes, with 92.11 percent of car trips, 81.58 percent of bus trips, and 100 percent of walking trips successfully detected.

GPS fixes can be collected with a frequency of up to once per second for each mobile phone, thereby generating a wealth of information of an individual’s travel behavior.

The software architecture utilized for TRAC-IT is being expanded under several other projects utilizing GPS-enabled mobile phones, including the Travel Assistant Device which turns an ordinary mobile phone into a real-time transit navigation tool through a mobile software application. Future work involving TRAC-IT includes larger deployments to utilize its unique capabilities to collect high-resolution travel behavior data for specific populations. Future research will also expand upon the path prediction algorithm and connect TRAC-IT to existing real-time traveler information systems in order to push highly relevant information to TRAC-IT users.
BSeT: Bus Size Evaluation Tool
developed to aid transit agencies

Transit managers throughout Florida continue to strive for greater operating efficiency while maintaining an appropriate balance between cost effectiveness and customer service. One cost-saving idea that has garnered increasing attention over the past decade is the use of heavy-duty transit buses that are smaller than the common 40-foot variety. Policy makers generally perceive that smaller buses, which range in size from 29 to 35 feet, cost less to acquire, maintain, and operate than their larger counterparts. In some cases, smaller buses may be required to satisfy route maneuverability constraints, accommodate residential and commercial growth patterns, and address off-peak empty bus syndrome.

Through the National Center for Transit Research (NCTR), CUTR was contracted by the Florida Department of Transportation to develop a decision support tool to assist transit agencies with evaluating heavy-duty bus fleets and making vehicle acquisition and deployment choices. The product of this effort, the Bus Size Evaluation Tool (BSeT), is a user-friendly and easily-modifiable computer application created within Microsoft Excel. BSeT was designed around a life-cycle cost calculator and a template of weighted factors to help transit agencies select buses that are best suited to satisfy their service obligations. It is important to point out that BSeT is not intended for use as a strict fleet optimization tool.

BSeT was the product of three distinct phases of research. First, CUTR examined previous studies, including an analysis of fixed routes and fleet composition for the Hillsborough Area Regional Transit Authority (HART) that immediately preceded the BSeT project. Next, a project advisory group comprising planning and maintenance managers from five Florida transit agencies was established. Last, the modeling technique was designed and implemented as a working software application. The accompanying final report includes a users’ guide along with sample BSeT analysis scenarios.

Although past research efforts identified several assessment factors critical to transit bus size decisions, prior evaluation models included only cost-related variables. For the BSeT application, CUTR sought to extend the tool’s assessment capabilities to include the impact of non-financial variables such as passenger load factors, service area constraints, special transit needs, and customer feedback. Of course, a set of economic considerations remained as the fundamental component of the evaluation tool. As such, researchers drew heavily on life-cycle cost calculations devised in the HART study, which was completed as a precursor to the BSeT project. Specific cost-related variables that formed the basis of BSeT included average annual miles, per mile maintenance (labor plus parts) costs, per mile fuel costs, and bus acquisition costs.

To ensure the strength and relevance of BSeT, researchers consulted with the project advisory group on a regular basis. Participants were determined based on agency fleet size and composition (a fairly balanced combination of small and...
large buses was most desirable), availability of required data, and willingness to participate in the project. Group members helped CUTR in acquiring per-vehicle life-cycle cost data from each participating transit agency and contributed to developing and weighting the non-financial qualitative assessment factors installed in the final decision tool. In addition, the advisory panel’s input assisted researchers with eliminating redundancies and leading statements that might undermine the tool’s credibility.

The evaluation structure within BSeT follows a basic design to ensure consistent measurement and comparisons of relevant factors and inputs. More than 850 vehicles comprise the composite bus fleet, ensuring a large enough database to provide significant values for each default variable. Researchers calculated life-cycle cost factors and installed the results into BSeT as default comparison measures (see table). However, one of the key benefits of the model is that it was designed to be fully customizable; users may override some or all of the default values. To protect users from inadvertent or otherwise unwanted changes to the default values, a fail-safe system is included.

“We now have a tool that will allow us to match the correct vehicle to our planned services.”

Steve Feigenbaum, HART Planning Manager

While cost analysis results generated by BSeT can vary according to the user’s data inputs and modifications (if any), the vehicle mix results are generally limited to three possible outcomes, based on the user’s overall priorities. Once the qualitative factor analysis has determined the general trend toward one bus type or another, the unconstrained share is assigned entirely to the bus size group that is most likely to satisfy the user’s priorities. In the event that the analysis reveals indifference regarding bus size, the model output effectively becomes a cost analysis of the existing fleet.

Although BSeT is a stand-alone tool, this project has laid the groundwork for supplemental modules to be developed in the future. For example, as more transit agencies adopt formal service planning guidelines, the tool could be revised to include specific guidelines into the model. Additionally, as energy prices continue to rise and interest in alternatively-fueled buses grows, a supplemental BSeT component could be developed to compare new vehicle types to conventional transit vehicles.

For further information on this study, contact CUTR TPEEA Program Director Steve Reich at (813) 974-3120, reich@cutr.usf.edu. To view the complete final report or to download the tool, visit the NCTR publications web page at http://www.nctr.usf.edu/publications.htm.
Public involvement activity evaluation system developed

Public involvement is a cornerstone of transportation planning and can involve tremendous amounts of time and money. To determine if public involvement resources are being spent wisely, managers need to periodically evaluate the effectiveness of their agency’s public involvement program. To help transportation agency management make these important decisions, the Florida Department of Transportation (FDOT) contracted with CUTR to establish a system for evaluating the effectiveness of public involvement activities.

During the course of CUTR’s prior work in public involvement, researchers found that FDOT had no formal methods in place to measure the effectiveness of public involvement activities.

“FDOT strives to be proactive in its public participation efforts,” said Rusty Ennemoser, the project’s manager and FDOT’s Public Involvement Coordinator, “but before this project began, we had had no way to measure if we are doing a good job.”

FDOT staff agreed that creating an evaluation system would improve the effectiveness of public involvement activities in the state. The project began in October 2007 and was recently completed with the publication of a final report in July 2008.

The first step in the project was to collect information on how and if other transportation agencies were measuring public involvement performance. A comprehensive literature review was conducted to identify related efforts on performance measurement, both generally and related to public involvement specifically. Additionally, a scanning survey of state transportation agencies and metropolitan planning organizations (MPOs) was conducted to identify existing efforts to systematically evaluate the effectiveness of public involvement processes and practices. In all, 74 survey responses were received from respondents at the federal, state, and local levels.

The literature and scanning survey provided several key insights into various aspects of performance measurement. Key findings of value to the development and implementation of a public involvement performance measurement strategy include the following:

- Practitioners often experience difficulty differentiating between “outputs” and “outcomes.” Outputs are the direct products and services delivered by a program or agency; outcomes are the results of those outputs.

- The common features of a successful performance measurement system appear to be a foundation in an agency’s mission and goals, strong support from senior management,
and obvious validity to the public and policy makers.

- Vaguely-worded goals, policies, and objectives are not conducive to performance measurement.

- Management support for the performance measurement system must be ongoing. Public sector performance often cannot be determined in the short term and, in some cases, may take decades.

- Agencies should use meaningful performance measures that will be of interest to the public, including policy makers. Public agencies should make performance data available and understandable to the public.

- There does not appear to be a standard terminology within public involvement circles when discussing performance measurement.

- Local agencies do not appear to be using a performance measurement methodology that was suggested or required by their state.

- Historically, public agencies have relied solely or primarily on quantitative measures for evaluation. However, recent trends encourage the use of qualitative research to complement—and even supplant—quantitative data.

- Agencies should avoid looking for a “silver bullet.” The literature warns that it is impossible to develop a measure that will actually measure what was intended and that no single comparison should be used to measure performance. Instead, multiple performance measures should be developed that, when taken collectively, indicate whether agency activities and programs are achieving agency goals.

**“FDOT strives to be proactive in its public participation efforts, but before this project began, we had no way to measure if we are doing a good job.”**

Rusty Ennemoser, FDOT’s Public Involvement Coordinator

To begin the next phase of the project, CUTR formed a project steering committee, which convened for the first time in Tampa in late 2007. The committee consisted of eight public involvement practitioners in Florida, with members drawn from FDOT Central and District offices, the Federal Highway Administration, and MPOs. The committee met five times to discuss the interim results from the research team.

Using an iterative review process, CUTR faculty and the working group drafted and edited a list of performance indicators that included 17 indicators that fit into four broad objectives: Equity, Information, Methods, and Responsiveness. The stated goal of the performance measurement system was to “Ensure that all interested parties have an opportunity to participate fully in the transportation decision-making process and that public input is carefully considered.”

The system of performance indicators strives to measure outcomes of public involvement activities, including participant satisfaction with methods used and agency responsiveness. The resulting performance data can be compared over time to demonstrate trends and allow management to make changes to enhance agency effectiveness. Results should also be readily available to the public. Allowing public access to the data helps convey the agency’s commitment to effective public involvement and highlights those areas where the agency is already excelling.

The public involvement performance measurement system can be deployed by any transportation agency. A copy of the final report can be downloaded from the CUTR website at [http://www.cutr.usf.edu/pdf/PIPM%20Final%20Report%206-26.pdf](http://www.cutr.usf.edu/pdf/PIPM%20Final%20Report%206-26.pdf). This report contains a detailed description of each performance indicator, including its purpose and data collection considerations. Sample targets were given for each indicator, but the research team cautions that appropriate targets should be developed to match the local conditions of the implementing agency.

For additional information, contact CUTR Research Associate Alex Bond, albond@cutr.usf.edu, (813) 974-9779.
CUTR faculty participate in BRT mission to India

In mid-2007, a delegation of Indian urban transportation officials led by India’s Urban Development Minister, Mr. S. Jaipal Reddy, visited U.S. transit agencies in California and New York, and met with senior U.S. transportation officials in Washington, D.C. The success of the tour stimulated interest within both countries to develop a formal bilateral working agreement to guide the development of future collaborative efforts.

As a result, a formal “Memorandum of Cooperation” was drafted and signed by U.S. Department of Transportation Secretary Mary Peters in September 2007. A reciprocal U.S. mission to India was coordinated in September 2007 that would include the formal ratification of the memorandum. CUTR’s National Bus Rapid Transit Institute (NBRTI) assisted in the organization of the mission, which was led by Sherry Little, FTA Deputy Administrator.

The mission itinerary was designed to provide the U.S. delegation with an opportunity to meet with senior Indian transportation officials, gain first-hand knowledge of India’s current plans for transportation infrastructure provision, identify lessons learned for the U.S. transit industry, and identify opportunities for U.S. transit industry involvement in the development of India’s transportation infrastructure.

Prior to formal commencement of the mission, CUTR Senior Research Associate Alasdair Cain and FTA’s Venkat Pindiprolu visited the Indian city of Indore. Indore has achieved worldwide recognition for the fast-track implementation of a high-quality bus transit system through an innovative public-private partnership arrangement in which 70 percent of the required capital investment came from the private sector. While in Indore, Cain and Pindiprolu met with local officials, toured the transit system, discussed plans for future BRT implementation, and made a presentation at a meeting of the Indore City Council, at which the BRT proposal was discussed.

The mission formally began in New Delhi, India’s capital. Activities focused on meetings with senior representatives of India’s national government, the signing of the Memorandum of Cooperation, and a tour of Delhi’s new subway system. India’s ambitious plans for improving urban transportation infrastructure in cities throughout India were discussed. This has been made possible through the Indian government’s commitment to a National Urban Transport Policy (NUTP) and overarching Jawaharlal Nehru National Urban Renewal Mission (JNNURM), which commits $13 billion over a seven-year period to urban infrastructure improvements in 63 cities around the country. BRT has been identified by the Indian government as having a major role to play in this strategy and will be the primarily form of rapid transit in cities with populations under five million.

The delegation then proceeded to the city of Ahmedabad to participate in a BRT Workshop sponsored by the Indian government and the United Nations Development Program (UNDP), which provided an excellent opportunity to learn about the BRT proposals in Ahmedabad and other cities...
across the country. The mission then proceeded to Mumbai to participate in the India Urban Space 2007 Conference, and to meet with senior representatives of India’s business community. At the conference, Little gave a keynote address in which she commented on the wealth of knowledge she had gained on her visit to India and the ambitious new proposals to revolutionize India’s urban areas.

The 2007 mission provided a number of useful lessons for the U.S delegation. India’s National Urban Transport Policy is an excellent example of an integrated transport strategy, combining transportation planning and land use planning and recognizing the need to provide high quality, public transportation and non-motorized mode infrastructure in conjunction with pricing measures capable of managing ever-increasing demand for auto travel. It was recognized that this integrated approach is applicable to both developed and developing world urban contexts and is similar in many respects to the current U.S. DOT Congestion Initiative, which seeks to reduce congestion through the integrated implementation of tolling, transit, technology, and telecommuting in six cities across the U.S. The U.S. delegation was also impressed by the recent successes made in India in the field of public-private partnerships, which is the subject of another current U.S. initiative led by the FTA.

As a follow-up to the 2007 mission, FTA has scheduled a second visit to India for late 2008. FTA James S. Simpson will lead the mission, which will include stops in New Delhi, Hyderabad, Mumbai, and Visakhapatnam, four cities that have been identified to receive grants ranging from $100 to $150 million from the national government to improve their urban transportation systems.

The itinerary includes a Bus Rapid Transit workshop and tour of a proposed BRT site in Visakhapatnam, a transportation roundtable in New Delhi, meetings with transportation authorities in Hyderabad, and a meeting with the Mumbai Metropolitan Region Development Authority. NBRTI staff also will be attending the International Conference on Best Practices to Relieve Congestion on Mixed-Traffic Urban Streets in Developing Countries in Chennai, where a paper on the status of BRT will be presented.

The full report on the 2007 mission to India can be found at [http://www.nbrti.org/research.html](http://www.nbrti.org/research.html). For further information, contact CUTR Senior Research Associate Alasdair Cain, cain@cutr.usf.edu, (813) 974-5036.

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Happy trails to Patricia Ball

CUTR is sad to say farewell to Patricia Ball, who has been instrumental to CUTR’s operations for the past 19 years, since 1989. A graduate of USF, Ball served as CUTR’s Administrative Services Director and publications manager, was the founding Managing Editor of the *Journal of Public Transportation*, and coordinated CUTR’s charitable activities. She will continue to assist CUTR with editing and publications activities from her home base in Tampa. Her dedicated service was recognized with a farewell brunch and an evening reception.
General aviation security: Needs and priorities

General aviation (GA) is an aggregate term that can be used to describe approximately 57 percent of all civil aviation activity in the United States, measured in terms of total flight hours. GA refers to all types of civil aviation except for scheduled passenger and scheduled cargo service or military aviation.

Most GA facilities do not run the same passenger and baggage screening procedures as those often seen at commercial airports. This, however, does not automatically make GA airports less secure. Typical GA operations are totally different from commercial service flights, and they do not require the same security measures. There are 10 times more public use GA airports in the United States than there are commercial airports, and they all vary greatly in size, purpose, and types of operations. Due to this diversity, the Transportation Security Administration (TSA) relies on a risk-based approach in providing adequate security at GA airports instead of pursuing a single across-the-board security solution.

In 2004, TSA published a set of non-mandatory guidelines for ensuring security at GA airports. These guidelines recommend security improvements consistent with the threat level of the airport that is, in turn, determined by the airport’s location, number of based aircraft, length of runways, and certain types of operations, including on-demand service, agricultural operations, operations of large aircraft, flight training, aircraft rentals, etc. The idea behind this risk-based approach is that airports located close to mass populated areas that have a large number of aircraft and/or large-size aircraft, long runways, and certain types of operations could pose a higher threat and are recommended to have more rigorous security measures.

While TSA has expressed a high level of confidence that these voluntary measures are working and that GA airports are compliant overall, no formal assessment of the security level at GA airports has ever been attempted at either state or federal level. The Secure Airports for Florida Economy (SAFE) Council, a 27-member body established by the Florida legislature in 2003 and tasked with enhancing the overall security of Florida’s aviation system, engaged the services of CUTR to identify and prioritize critical security needs and areas of concern to Florida GA airports.

CUTR surveyed all 84 public use publicly-owned GA airports in Florida and received valuable responses from 38 (a 45.2% response rate) regarding their security practices. The survey results indicate that:

- The primary types of operations for the surveyed airports include pilot training, aircraft rentals, and on-demand operations.
- Nearly 90 percent of the airports responding to the survey have a fenced perimeter.
- A total of 92 percent operate a fueling facility on site; the majority (71%) do not monitor their fueling facility after hours.
- Slightly more than 47 percent monitor airport access 24 hours a day.
- The top three priorities for ensuring GA security
are 1) preventing unauthorized airport access, 2) control of tenant activities, and 3) verifying the identity of student pilots and aircraft renters.

- The vast majority of the airports cited lack of funding as the primary obstacle for addressing these concerns.

As part of the analysis, CUTR applied the TSA risk-based approach to assess the security needs of Florida GA airports and reveal their compliance with the TSA recommendations. The survey indicates that 6 of the responding airports have all the recommended TSA security measures, while the remaining 32 are lacking between 1 and 7 of the recommended security measures. On average, GA airports have the appropriate number of implemented security measures, but they often do not have the exact types of security enhancements recommended by TSA. Contrary to general belief, smaller GA airports are not necessarily less secure than larger GA facilities. The lack of sophisticated security measures (e.g., intrusion detection systems, video surveillance, etc.) at smaller airports is compensated by the fact that unusual or suspicious activity at smaller airports is easier to notice than at larger facilities.

The findings show that many Florida airports tend to aim higher than TSA recommendations in providing airport security. However, the CUTR analysis also reveals that more than 73 percent of the surveyed airports invested in the security measures well beyond their designated threat level while, at the same time, overlooking some of the more basic security enhancements and procedures that could be implemented at a relatively low cost. For example, some smaller rural airports do not really need to invest in a sophisticated intrusion detection system. Implementing simpler measures, like a community watch program or a personnel ID system, might be a more cost-effective approach to ensure adequate security of the facilities.

CUTR developed a methodology to rank the potential security improvements based on the chosen prioritization criteria. Several ranking criteria were considered, including the number of unaddressed security recommendations, percentage compliance with TSA requirements, and total security index (TSI) that reflects the overall security level. TSI is defined as a ratio of all implemented security measures to the number of recommended security measures for the current airport threat level.

CUTR also ranked the airports based on the marginal improvement in compliance resulting from the implementation of an additional security enhancement at the airport. This approach can help identify the projects that yield the highest security improvements and can maximize the effectiveness of the use of limited funds available to the SAFE Council.

Several approaches the Council can take to select the potential security projects for funding were identified in the analysis. The outlined approaches include:

- assist the airports with their highest needs,
- assist the largest number of airports,
- spread assistance geographically throughout the state,
- assist the airports that are closest to compliance,
- implement security projects that yield the highest marginal benefits,
- implement specific types of security enhancement, and
- spend down the balance of the Council’s funds.

Each approach has its advantages and limitations but, ultimately, it will be the job of the Council to weigh the pros and cons of each policy option and decide how to proceed with funding security-related projects at Florida GA airports.

For more information, contact CUTR TPEEA Program Director Steve Reich, reich@cutr.usf.edu, (813) 974-6435.
New faculty join USF’s Civil and Environmental Engineering Department

CUTR is pleased to welcome two new transportation faculty to the USF Civil and Environmental Engineering Department.

Dr. Yu Zhang has both master’s and Ph.D. degrees in Civil and Environmental Engineering from the University of California-Berkeley. Her research interests include transportation network modeling and optimization, applied system analysis in transportation, air transportation, green transport, and sustainable accessibility. During her graduate studies, Dr. Zhang worked as a research assistant at UC Berkeley and also worked for consulting companies where she gained industry experience in airport and airspace management. She is an active member of several professional organizations and reviewer for research journals. Dr. Zhang can be reached at (813) 974-5846, yuzhang@eng.usf.edu.

Dr. Abdul Pinjari has a bachelor’s degree in Civil Engineering from Indian Institute of Technology, Madras, a master’s degree from USF’s Transportation program, and a Ph.D. in Civil Engineering from the University of Texas at Austin. His research interests include activity-based travel demand modeling and forecasting, travel behavior analysis for sustainable transport planning and policy formulation, evaluation of congestion pricing and travel demand management strategies, land-use and transportation interactions, and land-use, non-motorized travel and physical health relationships. His methodological research interests are in the areas of econometric and mathematical modeling of consumer choice behavior, including discrete choice models, discrete-continuous systems, and multidimensional choice systems. He has been actively involved in the development, application, and testing of an activity-based travel demand model for the Dallas Fort-Worth area and worked on a variety of transportation research projects for local, state and federal agencies. Dr. Pinjari can be reached at (813) 974-9671, apinjari@eng.usf.edu.

CUTR Director Dr. Ed Mierzejewski noted, “I am delighted to have these talented teaching and research professionals join the Engineering College. We look forward to working with them in educating the transportation workforce and addressing transportation challenges through collaborative research efforts.”

CUTR welcomes new faculty

CUTR is pleased to welcome Ed Hillsman as a senior research associate in the Transportation Demand Management Program. For the last nine years, Ed was a senior scientist in the Washington State Department of Transportation’s Commute Trip Reduction program, overseeing measurement and evaluation of the program. From 1996-1998 he served as a senior research associate in the Energy, Environment and Resources Center at the University of Tennessee–Knoxville where he conducted research on data for response to natural disasters and on shopping travel behavior. Prior to that, he worked at Oak Ridge National Laboratory, where he first developed his interest in transportation and climate change. He received master’s and Ph.D. degrees in Geography from the University of Iowa. Welcome aboard, Ed.
2008 CUTR Transportation Achievement Award honors Bob Burleson

CUTR is pleased to announce that Bob Burleson has been named the recipient of the 2008 CUTR Transportation Achievement Award in recognition of his outstanding contribution to addressing Florida’s transportation needs. Bob is the President of the Florida Transportation Builders’ Association, Inc., a position he has held since 1989.

Bob has nearly 40 years’ experience in the transportation industry since graduating from Virginia Tech, where he played on the varsity tennis team. He spent over 15 years with the Wiley N. Jackson Company, a major southeastern transportation construction company, serving as Vice President for Administration and North Florida operations until the company was sold in 1987. He then relocated to Tallahassee to join FTBA.

Bob is a past recipient of the ARTBA Award for the contributions he has made to the national organization, and is also a past recipient of Floridians for Better Transportation’s Golden Eagle Award. Bob and his wife Beverly have three sons and four grandchildren.

The 2008 CUTR Transportation Achievement Award Dinner will be held on October 29th, 2008, at the newly-renovated Phyllis Marshall Center on the USF Tampa campus. For further information, please contact Lynn Federspiel at (813) 974-9759, federspi@cutr.usf.edu.

In addition to the CUTR Transportation Achievement Award, this year’s dinner will also take note of CUTR’s 20-year anniversary by recognizing several individuals who were instrumental in the creation and early successes of CUTR: former Florida Senators Malcolm Beard and Jim Hargrett and Senate President Tom Lee, former Florida representatives Mary Figg and Vernon Peeples, former USF Engineering Dean Glenn Burdick, and CUTR founding director Gary Brosch.