1. SUMMARY

Changes in technology and new thinking about sustainable transport systems are coming together to enable fresh approaches to door-to-door transportation required by mobility-impaired persons in less-wealthy countries. In part this is due to the growing realization that many other categories of passengers, and not just persons with disabilities, benefit from the inclusive design and operation of public transport systems. Other new factors include emerging smart phone and dispatching technologies, new approaches toward mobility management to assist existing services and promote new startups in the paratransit field, and a growing appreciation for the potential of informal transport sectors. This may create new opportunities to supplement more traditional paratransit models based on small fleets of vehicles operated by schools, health centers, and NGOs to bring clients to their services. These approaches may help practitioners to initiate door-to-door services in developing regions and also to scale up existing paratransit systems to meet the needs of more categories of passengers. They are explored in a new guide, published by Access Exchange International (AEI) of San Francisco and edited by the author of this paper. The guide was introduced at TRANSED 2012 in New Delhi. The guide cover, shown above, was prepared for AEI courtesy of Svayam, the host agency for TRANSED 2012.

The purpose of this paper is to present key findings from this guide.

Key Words: paratransit, accessibility, service models

2. METHODOLOGY

The guide is drawn from the experience of selected accessible paratransit systems in Asia, Latin America, and Africa. Their experience is supplemented by lessons learned by practitioners in North America with many decades of experience in the

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1 As used in this paper, “paratransit” refers to the use of vans, mini-buses, taxis, auto-rickshaws, cycle-rickshaws and other small vehicles operated in door-to-door (or curb-to-curb) service to exclusively or partly serve persons with reduced mobility.
paratransit field. The guide also incorporates materials and insights gained during work by the author in twenty-five countries – primarily in Latin America, Asia, and Africa – while promoting accessible bus, rail, and paratransit services.

3. DISCUSSION

The rapidly growing populations of Asia, Africa, and Latin America include hundreds of millions of persons with disabilities. While efforts are going forward to improve access to bus and rail transport, it is clear that transport for persons with mobility, sensory, and cognitive disabilities must also focus on the growth of door-to-door transportation using minibuses, vans, auto-rickshaws, and a variety of other small motorized and non-motorized vehicles. These services can also play a role in making public transit more usable by seniors, women, children, visitors, and tourists who find it difficult or impossible to navigate fixed route transit systems. As matters stand now, efforts to promote employment, health, education and tourism are often frustrated by a lack of transport for such persons.

To help address this state of affairs, the guide presents different service models for door-to-door transport while discussing funding sources, sustainability issues, vehicle procurement, driver and staff training, and ongoing evaluation through user input, service monitoring, and the use of performance indicators. The publication also provides practical guidance on scheduling and dispatching, marketing, maintenance, and facilities management. Passenger policies and prioritization of service through different mechanisms are discussed to help address the many situations where demand exceeds system capacity. The guide describes a range of potential revenue sources used by door-to-door systems in different locales, along with methods to reduce cost per trip through coordination between the public, private, and non-profit (NGO) sectors, and through different service models that also take advantage of emerging technologies. Subjects introduced within the guide will be directly linked to fuller information on AEI's website at www.globalride-sf.org/paratransit/guide.pdf, including expanded treatments of several of the topics introduced in the guide.

The current situation

The current model of paratransit services in much of the world is centered on provision of services using mini-buses and vans to transport passengers to schools, clinics, and other services. These valuable services meet important needs. In a few major cities, the client-centered approaches can be quite large and may be operated by municipalities utilizing dozens or hundreds of vehicles with a focus on bringing clients to multiple special education schools (State of São Paulo, city of Curitiba, Brazil), rehabilitation centers (Istanbul), or work sites (Cape Town). Some of these systems focus almost entirely on wheelchair users (Cape Town, Kuala Lumpur). Others have broad trip purposes for broader categories of users (Moscow, Hong Kong), but clearly have only a limited capacity to meet their total need. The capacity of all of these paratransit systems is sharply limited by constraints on funding. Services which are less constrained are mainly limited to wealthier regions in North America and Europe which, in turn, may come under greater financial pressure in years ahead.
Different approaches are required in the many situations in less-wealthy countries where practitioners may wish to start up or scale up a door-to-door paratransit system to meet more of the needs of larger categories of passengers. Several of these approaches are highly interactive with each other, but are teased apart within the guide so that readers can better study their applicability in the very different situations faced by different practitioners.

Key findings include:

3.1 NGOs and other agencies can upgrade their management of paratransit vehicle fleets to improve the quantity and quality of service.

Agencies need to recruit and retain qualified personnel to serve as drivers and support staff for paratransit systems. In turn, training needs to assure competent and safe driving skills, with a special emphasis on disability awareness. If a wheelchair ramp or lift is used, drivers must be trained to safely operate these devices and properly secure passengers and their wheelchairs once within the vehicle.

A section of the guide focuses on driver training and safety. The graphic at left illustrates a simplified version of possible wording of a pocket-size card to promote safe and courteous driving where capacity for formal training is reduced or lacking. Different versions of this pocket card\(^2\) are included in the guide, which also points readers toward more detailed training materials.

The guide also provides guidance on receiving trip requests and on the efficient scheduling and dispatching of vehicles. Well-proven techniques for scheduling trips are included, such as grouping passenger pickups and drop-offs in as small an area as possible or along a corridor leading to a trip destination, taking care to schedule in driver rest periods and vehicle fueling, and other common-sense approaches to avoid 'deadheading' without passengers or zig-zagging between pickups and drop-offs in an unproductive manner.

3.2 Coordination between agencies may enable paratransit to serve more passengers for more trip purposes.

There are many tens of thousands of vans, minibuses, and other small vehicles operated by public and private agencies and NGOs in less wealthy regions. Great numbers of these vehicles are dedicated to bringing students, patients, and other clients to fixed facilities such as schools and clinics. One observer notes that “After staff salaries, transport is the largest budget item for humanitarian agencies. Much of the money is wasted through inconsistent procurement policies, shoddy maintenance, negligence, road accidents and bureaucratic headaches.” . . . (Agencies do not) “consistently implement driver training programmes. Road safety issues are generally not considered as an integral component of relief and development operations. Procurement of vehicles is conducted in an ad hoc manner with only limited regard to the standardisation of specifications and opportunities to leverage reduced pricing and services from suppliers.”

The positive side of this state of affairs is that there are opportunities for NGOs to work together to procure, operate, and maintain vehicles at lower cost. For example, NGOs may wish to work together to jointly obtain a garage or area for safe secure storage of their vehicles when not in use. They may wish to work together to negotiate for volume purchase of fuel, using the greater purchasing power that comes with bargaining on behalf of a larger group of agencies. Again, by joining forces they could sometimes negotiate lower cost maintenance of their vehicles by a commercial source, or contract out for training of their drivers and other staff by a professional training provider.

There are also a variety of strategies for NGOs or other agencies to serve more passengers for more trip purposes by taking advantage of staggering service hours of different agencies to permit vehicles to serve more clients, or otherwise use their vehicles at times when they are not being fully utilized.

NGOs may also wish to explore hiring commercial transport providers to serve their needs, or, in other cases, to sell their own transportation services to serve the clients of schools, hospitals and other agencies that may have the resources to pay for such services but do not have the resources to transport their clients "on their own."

3.3 The use of smaller vehicles, combined with new technologies, open up new possibilities for less-expensive paratransit service

3.3.1 Taxis

Millions of persons with disabilities live in dense urban areas. In many cases, taxis adapted with ramps and wheelchair securements have efficiently provided these services at all hours, while in areas with fewer taxis the use of vans or mini-buses traditionally has been advisable. Taxi fleets already provide vehicles, drivers, maintenance, dispatching and other service elements. Even when not wheelchair

accessible, taxis equipped with swivel seats can serve 90% of disabled passengers. Their use may eliminate the need to "reinvent the wheel" by creating a new specialized service with dedicated vans or mini-buses which frequently must make longer trips in order to serve fewer passengers in a dense urban area. Incorporation of taxi companies into municipal paratransit systems is an activity that can benefit from the use of a "paratransit broker." The broker can serve as a coordinating agency to select taxi and/or commercial or NGO van or mini-bus contractors through competitive bidding or open-entry agreements with these private or non-profit service providers. This mix of vehicles can then serve different passengers in different situations or in neighborhoods with different densities.

Global Positioning System (GPS) technology, mobile phones, and related technologies are increasingly in use with taxi fleets. For example, the London Taxi App, or the "Cabulous" app, which use GPS technology, enable someone in need of a ride to see where nearby taxis are located in real time and then talk directly to the driver. Other technologies, such as Google's Wallet app, enable electronic payment to be made on the spot. Smart-card or bank card payment systems may enable governments to more readily and cheaply provide direct subsidies to disabled passengers. These technologies will gradually become less expensive over time. They clearly make it easier for those disabled passengers who can afford taxis and can benefit from the convenience of a call center with central dispatching of taxis.

3.3.2 Auto-rickshaws

The use of motorized auto-rickshaws, cycle-rickshaws and similar vehicles charging lower fares should also be considered where possible. Such vehicles may be usable by most persons with disabilities, including those wheelchair users who can safely transfer to the passenger seat provided space is provided to safely carry a folded wheelchair. Auto-rickshaws are found by the tens of thousands in many Asian countries and in some regions of Africa and Latin America as well. Many persons with disabilities currently rely on them. As fuel prices increase, they will probably also find greater acceptance in Europe and North America. India alone manufactures some 400,000 auto-rickshaws every year. The photo above illustrates the relative ease of entering a motorized low-floor auto-rickshaw, using vertical and horizontal handholds at a test session hosted by Svayam in New Delhi in late 2011 at the facilities of GNB Motors.

Entrepreneurs, city officials, and larger NGOs should consider GPS and mobile phone technologies that open up new possibilities for less-expensive and more convenient services using auto-rickshaws. Some service models invite participation by existing owner-drivers of auto-rickshaws, while others utilize vehicle fleets owned by a company.
Entrepreneur-driven auto-rickshaw fleets with call centers have grown rapidly in India. For example, commercial startups utilizing call centers are reported in the Indian cities of Chandigarh, Delhi, Gurgaon, Ahmadabad, Rajkot, Vadodara, Mumbai, Pune, Bangalore, and Chennai. Cycle-rickshaw call centers are reported in various cities in Punjab, organized as a non-profit benefitting the rickshaw drivers. These call centers usually connect with fleets of vehicles that utilize on-board GPS units and provide mobile communication between drivers and the call center. Some call-center operations charge a surcharge on the prevailing auto-rickshaw fare, which still is considerably lower than that of taxis. This surcharge may be reduced for seniors and persons with disabilities. Services may emphasize security for women, children, and seniors. Auto-rickshaw drivers may receive special training to assist seniors and persons with disabilities. Call center startups need to pay special attention to driver training, to assure courteous and competent treatment of their disabled passengers.

The advantages of auto-rickshaws include lower costs and thus lower fares, a low-floor design, and in some cases the ability to accommodate folding-type wheelchairs. However, safety concerns increase with the use of smaller vehicles such as auto-rickshaws. There is especially a need for research into alternative methods for the use of seat belts. Mini-taxis (for example, Tata's Nano) may be able to charge competitive rates with auto-rickshaws and provide a different set of advantages and disadvantages in terms of accessibility.

3.3.3 Long-term implications

If a person with a disability can communicate directly with a nearby taxi or auto-rickshaw, the scheduling and dispatching support structure can be reduced or eliminated.

GPS, smartphone, and payment technologies may enable a restructuring of many paratransit services in developing regions in years to come. Mobile phone expansion will probably trend toward smartphones with paratransit-related applications. However, there may still be a need for an integrating agency "to put it all together" in terms of certifying eligible clients if fare subsidies are offered, or if incentives are needed for drivers or companies to provide a higher level of service to disabled passengers.

These approaches may be assisted by regulatory reforms in the auto-rickshaw permit process and by reforms to road safety, including the segregation of auto-rickshaws from other motor vehicles in particularly congested areas.

Summing up, new technologies and the use of fleets of small commercial vehicles provide a breakthrough in creating higher-volume and lower-cost mobility for disabled persons, even if the requirements for such a service may sometimes require use of a brokerage or other agency to integrate and coordinate the different elements of the system.

Governments unable or unwilling to directly subsidize the paratransit fares of low-income persons with disabilities may wish instead to subsidize the development and implementation of access features to make vehicles more accessible and to better train drivers serving passengers with disabilities. Not the least of these features is the development of more accessible auto-rickshaws and cycle-rickshaws that can be
utilized by those wheelchair users who cannot transfer to a regular seat during travel. Typically this will focus on designing the rear or one side of the vehicle to be hinged as a ramp, which may require extensive re-design of a sub-fleet of more specialized vehicles.

3.4 Mobility management and demand management may open up new approaches toward starting up and scaling up paratransit services.

3.4.1 Mobility management

Cities in less-wealthy countries may neglect opportunities to assist NGOs because they do not wish to bear the cost of directly subsidizing accessible paratransit provision. But there are approaches which are far less expensive and can leverage resources which may already be on hand.

City and other governments could foster coordination by making it more profitable for NGOs to work together. Cities could assist with (1) free or low-cost driver training programs for NGO staff, (2) insurance coverage at lower cost by enabling a group of NGOs to negotiate such coverage after meeting driver training requirements, (3) provision of lower-cost maintenance facilities (or enabling a consortium of NGOs to contract out maintenance at a lower cost), and (4) provision of lower-cost fuel by enabling bulk purchase, possibly at a central fuel depot.

Governments could also help NGOs by defraying the cost of their vehicles, possibly in combination with bulk purchasing schemes. This would assist governments to promote safety by making good driver training a condition for their help, and, possibly, requiring agencies that benefit to then serve larger populations beyond their own client base. However, there may be negative tradeoffs if too many "conditions" are required in order to obtain municipal or other assistance – it is a matter of balance.

Many not-for-profit systems would be able to fund ongoing operating costs while filling important roles in the overall provision of paratransit services, if they were to receive assistance with one-time vehicle procurement costs. A large-scale example of this approach is the "Section 5310 program" of the USA's federal government, that provides vehicles to non-profit and public agencies to assist them to provide paratransit services to persons with disabilities and elders. Nearly 17,000 vehicles were purchased under this program in a recent eight-year period.\footnote{The author is indebted to conversations in June, 2012, with Russell Thatcher, Senior Transportation Planner with TranSystems Corp. in the USA, for this example and some of the other ideas discussed in this section.}

Foundations and corporations have often donated vehicles to NGOs around the world to serve their client base. Increasingly, these funding agencies are aware of the need for sustainable cities with an efficient paratransit component that provides universal access to everyone. In addition to "capacity building" to help NGOs manage their vehicle fleets, foundations and corporations and other funding agencies need to consider how to also focus their grants to promote mobility management and demand management to scale up accessible paratransit services provided by NGOs and other agencies in less-wealthy countries.
3.4.2 Demand management

There are also innovative ways to reduce the cost per trip, especially in rural areas, by "bunching" trips at certain times and places, that is, by concentrating the trip demand at specific times and locations. This permits potential passengers to request trips, or be on hand at stops along routes, at stated times. Service could be available just a few times a day, or once a day, or perhaps only one or two days a week or even month, but at least the passengers could plan ahead, for example to schedule medical appointments in a district town. Examples of this approach are in operation or being planned in the USA, France, Cuba, and South Africa.

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