Transport for All: What Should We Measure?

Comments on the use of indicators and performance measures for inclusive public transport in developing regions

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Introduction

Performance measures are needed to assure that steps toward accessible public transport[1] in developing countries are focused where they will be most effective. This includes the monitoring of private, public, and non-profit transport operators to insure they meet measurable criteria and standards for access features and inclusive operating procedures. By analyzing measurable outcomes, all stake-holders will be able to learn from steps already taken.

This paper is intended to provide introductory comments on two areas related to performance measures:

- What measurements assist in establishing and monitoring goals and quantifiable outputs for accessible transport
- Some key issues in measuring inclusive transport in developing regions

The purpose of this document is to describe and comment on what can be measured, rather than to recommend norms or guidelines which can be found elsewhere.[2]

The preparation of this paper has been encouraged by Peter Roberts of the World Bank's transport staff as input into the Bank's newly forming Transport and Social Responsibility Thematic Group. This paper also responds to comments made by other practitioners at both the World Bank and the Inter-American Development Bank. However, the resources for this document are provided entirely by Access Exchange International[3] (AEI) with the hope that it might be of help to varied stakeholders ranging from NGOs operating small fleets of vans to development banks funding major road, rail, and bus infrastructure projects. Indicators can range from the very specific (e.g., the percentage of buses deployed on a single route with hand grasps painted in a high contrast color) to the very general (e.g., a

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[1] "Accessible" and "inclusive" are used interchangeably in this working paper, while "universal design" has only a slightly more restricted sense, as seen in *The Principles of Universal Design* at www.ncsu.edu (go to "Center for Universal Design" at this site).

[2] Readers are especially referred to *Enhancing the Mobility of Disabled People: Guidelines for Practitioners*, published in 2004 by TRL Limited in the UK and prepared by a project team sponsored by the Department for International Development of the United Kingdom in collaboration with TRL, CSIR Transportek in South Africa, Access Exchange International, India's Central Institute of Road Transport, and agencies in Malawi and Mozambique. To download this publication, go to the Resources section of AEI's web site at www.globalride-sf.org.

[3] Access Exchange International is an NGO (non-profit agency) based in San Francisco, California, with the mission of promoting accessible transport in developing regions in Africa, Asia, the Americas, and elsewhere. Further information is available from AEI's web site. AEI wishes to thank Kate Toran and Richard Weiner of our Board for their review of a draft of this document. Ms. Toran is with the Accessible Services office of the San Francisco Municipal Railway and Mr. Weiner is with Nelson/Nygaard Associates in San Francisco.

determination that a policy framework for accessible transport is in place in a given country). Different indicators are relevant to different stakeholders.

What can be measured?

Indicators provide data signifying in a general way how the results of a project or the outputs of a process (such as that of providing transport services) line up with desired goals. Performance measures usually provide data which more specifically measure the degree to which results meet the needs and expectations of a stakeholder. Compared with performance indicators, performance measures are stricter and more quantitative benchmarks of results.

Measures can be *direct* ("Disabled passengers took 250 trips in March on Bus Route # 17") or they can be *proxy* or *surrogate* measures which are substituted for the direct measure ("Following the deployment of low-floor buses at newly improved bus stops on Bus route # 17, Rehabilitation Center A reports that 20 additional persons living near this route are now using their services.") Both the direct and the proxy measures provide helpful data to understand the results of an investment in low-floor buses and accessible bus stops along Bus Route # 17. Both measures can be compared a year later to indicate if usage is increasing or decreasing. Both measures permit comparisons to the situation prior to initiating accessible bus service as well as a comparison to some stated objective for anticipated performance.

There is a need to measure conditions prior to implementing inclusive transport features as well as conditions after improvements have been made. Quantitative measurements made *before* improvements are made to a transport system can document needed changes, provide a rationale for prioritizing first steps where they will be the most beneficial, and provide a base line against which to evaluate the impact of improvements after they are made. Periodic measurements taken *after* improvements are made help managers to assess their effectiveness and take steps to correct problems. Each type of measurement has different advantages and disadvantages in terms of accuracy and also the cost of taking the measurement.

- **Measuring who is using public transport**

Many bus and rail agencies use different types of surveys to understand their passengers. How many children, adults, and seniors are transported? What is the passenger split between males and females? What percentage of passengers have a disability and what are the functional limitations that these passengers may have (e.g., sensory, cognitive, or physical disabilities)? Of those with physical disabilities, how many use wheelchairs?

This type of passenger profile survey can often be combined with an estimation of total trip making by the different sub-groups of passengers. There are different

types of passenger profile surveys for fixed route systems, as noted in the table below:

Type of survey	Key advantages	Key disadvantages
Estimates made by bus drivers	• No cost or low cost	• Drivers are usually too busy to do this. This method is not recommended.
Observations by staff who report to a transit company or regulator (e.g., observations at heavily used transit stops or on board a certain % of vehicles)	• More impartial • Low cost if observations only made of a small percentage of total system • A single staff person could do the survey if the system is small	• Probably not a scientific sample of passengers (e.g., disabled passengers often try to avoid peak hour congestion) • Too subjective (Different observers will have different criteria for who is "disabled," who is a senior)
Survey personnel interview a representative sample of passengers (e.g., every tenth person going through a fare gate at a railroad terminal, with written surveys returned to surveyors *or* a verbal interview)	• Can be highly representative if a valid sample of passengers are interviewed or fill out a survey	• A written survey instrument will not work with persons who do not speak or read the language of the survey instrument • A personal survey may alarm some passengers who are not accustomed to this approach. • High cost

Passenger profile surveys can also be useful for determining the neighborhoods where passengers live, how they get to transit stops, etc.

• **Measuring satisfaction with the service**

Although measuring feelings of satisfaction is clearly more subjective than measuring usership, general conclusions can be drawn about how well transport is meeting the needs of specific groups. In addition, periodic comparisons of user satisfaction provide managers with a helpful tool to make course corrections and address concerns raised by passengers. Here are some approaches:

Type of survey	Key advantages	Key disadvantages
Focus groups (a group of users – e.g., representative of different types of disabilities) comes together to discuss specific issues affecting their ability to use transport (e.g., relating to access, cost, reliability, and safety) Carefully selected to be as representative as possible.	• Cost varies, but could be kept low. • Provides indispensable knowledge of how customers actually feel about the service • Focus groups also help disabled persons to define barriers in a helpful way so that transit agencies really understand how to remove barriers to access.	• May not be representative of all users • Inaccessible transport may make it impossible for rural and poor persons – and especially those with disabilities – to get to a focus group

Public meetings, sponsored by a transport or gov't. agency or an NGO, to which disabled persons and/or other user groups are invited to discuss their access to public transport.	• Low cost • This method creates a constituency to advocate for access to transport, even in the absence of effective government support for access or regulation of transport	• Probably not as representative as a carefully selected focus group, raising the concern that the views of some users (e.g., with some types of disabilities) may not be heard
Household surveys carried out by trained personnel	• Can be highly representative if a valid sample of households is included and carefully prepared questions are asked to help quantify issues of transport access	• Probably more expensive than other methods
Mailed questionnaires (e.g., to a representative sample of persons with disabilities)	• Properly worded questions can produce a wealth of information from those who do reply.	• May require multiple languages, alternative formats (e.g., Braille, large print) • Does not reach persons who cannot read • Rate of return may be too low to justify cost
Telephone surveys	• Useful in areas where most people have a telephone • Allows for deeper understanding through followup questions	• Useless in areas where most people do not have a phone • Costly • Time consuming

• **Counting one-way trips**

Trip-making data readily yields a cost per trip which is a critically important management tool in evaluating service efficiency. These data are helpful when evaluating a service over time (e.g., from month to month, or year to year) or when comparing one service to another.[4]

For example, many government agencies and foundations, as well as corporations and individuals in some countries, provide funds so that agencies of various kinds can have automobiles or vans to carry out their work in developing regions. They

[4] Such comparisons are more difficult if one agency has passengers living close in to a center while another must transport passengers over longer distances. In such cases, the total kilometers traveled by all passengers yields a "cost per passenger kilometer" for more accurate comparison. (If passengers A and B each travel 4 kilometers and passenger C 10 kilometers, then this trip provided 18 passenger-kilometers of service. Instead of a laborious process of adding together kilometers for each passenger, most agencies can quickly estimate an average length for each passengers trip (based on measuring a sample of trips) and then multiply this figure by the total number of passengers transported over a given period.

need to know how well the vehicles will be used. For example, it may turn out that it may be less expensive for an agency to contract with a for-profit transport company (if a reliable company is available) to provide the needed services.

One-way trips are simple to measure when an agency uses small vehicles for door-to-door trips. However, managers must avoid the pitfall of measuring round trips – which would be a perfectly understandable pitfall for, say, rehabilitation agencies bringing a client to their center and then returning the client home. Just as public bus systems only measure one-way trips, so too should NGOs to avoid confusion and errors when passengers use different modes. For example, a person requiring kidney dialysis may be able to walk or take a bus to a dialysis center, but may require door-to-door transportation home due to his or her weakened condition following dialysis.

In the case of door-to-door services, total trips can be derived from fares collected or from dispatch lists. This is usually more accurate than asking drivers to report the total number of passenger trips.

In the case of fixed-route bus, mini-bus, and rail services, total trips by passengers with disabilities could be extrapolated from estimates made during a passenger profile survey (see above).

Counting trips by wheelchair users using fixed route buses or trains is a special case. While passengers using wheelchairs are easily defined, accurate trip counts are difficult to gather. Counters can be attached to wheelchair lifts or power ramps, but they also count cycling operations during normal maintenance. Driver data is difficult to verify as drivers may feel motivated to overcount or undercount, or simply be forgetful in the midst of other duties. Overall, the tendency in the author's experience is that trips are undercounted.[5]

Trips could be estimated using other approaches such as mailed surveys[6] or telephone surveys (where telephones are in general use) of a sample of passengers, perhaps coming from the memberships of local disability NGOs. Survey results could then be extrapolated to the entire population of disabled persons to yield crude estimates of total usage. Relative changes in trip-making over time could be analyzed with greater refinement if the same group of passengers is surveyed.

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[5] The author was Manager of Accessible Services for San Francisco, California's, public transport agency during most of the 1980's and tasked with monitoring fixed route and door-to-door performance measures during that time.

[6] Alternative formats (braille, large print, other*) must* be used, however, in order to gather valid results. Mailed surveys are not likely to produce helpful results in many cases, as there is less opportunity to respond to questions than there would be in a focus group, and language and literacy issues, and the regularity of mail service, all present issues in many countries.

• **Proxy counts to measure outcomes**

When counting a subset of passengers is too difficult, practitioners may have to substitute proxy or surrogate indicators to measure the impact of accessible transport. Though less satisfactory in terms of measuring total trip making by, for example, passengers with disabilities, proxy counts can target specific trip purposes. Indeed, proxy indicators can become direct indicators if their purpose is to measure the "public good" created by inclusive transport.

A list of common indicators may illustrate this:[7]

Type of Indicator (could be specified as a percentage or as an absolute number)	**Proxy** (Typically pre and post reports in which transport is seen as the critical factor)
Increased education	• Reports on enrollment in schools, colleges, vocational training programs •Changes in enrollment in special education programs
Increased health care	• Reports from hospitals, medical clinics, physicians, other health care settings
Increased employment	• Reports from employers of number of disabled employees (can include reports from sheltered workshops or social service settings)
Independent living	• Increased ability to live in independent residential housing

• **Measuring design features**

Access audits[8] can measure the degree to which accessible design features have in fact been provided or maintained. Such audits can be carried out by regulatory agencies reporting to transport ministries, by NGOs advocating for inclusive transport, or by other agencies. Audits should be performed in an equitable and knowledgeable manner, based on objective and measurable criteria, norms, or guidelines. The following are examples of questions answered by an access audit.

Example: *(yes/no) Entrance ramp of railroad station does not exceed a 1:12 grade (and other required dimensions)*

[7] These particular indicators are used in Austin, Texas, and the Buffalo-Niagara region of New York State in the USA.

[8] Further information on access audits and related topics can be found in T. Rickert, *Making Access Happen: Promoting and Planning Transport for All*, Access Exchange International, San Francisco, 2003. For an electronic version, go to www.independentliving.org/mobility/rickert200302.pdf.

Example: *Taxi Service A (under contract to provide service to disabled persons) has provided portable ramps in X vehicles (meeting stated requirements)*

Example: *Bus Company B has achieved its goal of painting step edges and hand grasps a bright yellow on x% of its units (meeting specific color contrast and quality requirements if appropriate)*

- **Measuring system performance**

A passenger commendation and complaint system is a low cost means of measuring the accessibility of fixed route operations. Commendations are as important as complaints as they can be used as a basis for rewarding drivers and other transit personnel. Complaints can be tallied by period and by type. In a city with large transit systems, a complaint office with a small staff may be relatively inexpensive. In many urban areas where telephones are in common use,[9] a telephone number for complaints is required to be displayed in large letters on transit vehicles, along with the vehicle number or other ID. Even when telephones are not in common use, management staff or regulators could use other survey methods (e.g., focus groups, advisory committees, public meetings, household surveys, interviews in transit environments, meetings with disability NGOs) to receive complaints and commendations.

Examples of complaint categories[10] include:

- Bus did not pull to curb for a disabled passenger
- Operator did not ask priority seats to be vacated for disabled or elderly passenger
- Wheelchair lift or securements defective
- Discourtesy by driver to a disabled passenger (includes service animal issues)
- Pass-up of a disabled person
- Driver did not call out stops or transfer points (especially assists passengers who are blind or with low vision)
- Wheelchair user pass-up

Complaints can then be reviewed by staff and presented to consumer advisory committees. Complaints by category can be compared with the level of complaints the previous year in order to analyze trends and take needed actions.

Performance measures are particularly useful to periodically evaluate how a transport system is performing. They provide a valuable management tool to correct problems before they get out of hand. Inclusive design and accessibility features may also change over time similar to all aspects of transport operations and therefore should also be subject to periodic review. In order to achieve the greatest possible transparency, performance measures could be posted on a transit agency's web site (where possible) and also reported to disability NGOs and to the media. Performance measures should be as simple as possible, understandable to all

[9] E.g., this approach is enforced in Mexico City by SETRAVI, the municipal transport ministry.

[10] These categories are monitored monthly by the San Francisco, California, transit agency

concerned, and relevant to the most important goals of the project or agency. Managers should carefully look at tradeoffs between the time and cost of collecting data for performance indicators, on the one hand, and the utility of the data, on the other.

Readers are encouraged to review the attachments to this paper, which list categories of subjects for which performance data is gathered by representative large door-to-door and fixed route operations. The lists are meant to be suggestive, not prescriptive. Readers in different countries will want to prepare indicators or performance measures for categories which are relevant to their own planning or management tasks.

• In some cases, performance measures exclusively evaluate services for passengers with disabilities. This is true of data collected by many door-to-door systems serving disabled passengers, such as those listed in **Attachment B**.

• In other cases, performance measures evaluate services for all passengers, and may be supplemented by additional measures gathered by designated staff relative to service quality and quantity for passengers with disabilities. An example of categories covered by a large multi-modal fixed-route system is found in **Attachment C**.

• **Attachment D** provides a list of categories measured by a specialized survey used by a large regional commuter rail system. Again, service quality categories are viewed as important to all passengers, although some of the categories have been included specifically at the request of agencies representing passengers with disabilities.

While attachments B, C, and D present categories which are measured by large transit systems in the San Francisco Bay Area of the USA, they are representative of performance measures found in large systems throughout the world. Many categories may not be relevant in smaller transit systems, or in systems which cannot afford to collect the many types of information found in the attachments. In all systems, performance indicators can improve management's ability to objectively identify operational issues rather than relying on subjective staff observations.

Some key issues in measuring inclusive transport in developing regions

Monitoring accessible transit for passengers with disabilities faces special challenges in developing regions, ranging from the difficulty of estimating who will be served to issues arising out of the current "politics of development."

• **It can be difficult to measure a subset of fixed route transit passengers.** Measuring the kilometers of paved roads, the number of buses or taxis or rail cars in a fleet, or the number of unlinked passenger trips is, at least in theory, a

straightforward process.[11] This apparent straightforwardness also pertains to systems *exclusively* serving disabled persons and seniors (e.g., most door-to-door systems using dedicated vehicles or some types of service routes) because, again, all passengers are counted. Measurements are more difficult when one goes beyond counting the number of passenger trips taken to instead quantify the "public good" – for example in terms of health care or education or employment – emerging from access features for a given road, bus rapid transit system, or other transit project. This especially occurs when trying to quantify the benefits enjoyed by a subset of passengers who use a transit mode, such as those who *especially* benefit from the inclusive design and operation of passenger transport.[12] Nevertheless, the use of passenger profile surveys, combined with proxy indicators, as discussed on pages 4 and 7 above, can provide a method to estimate the outcomes resulting from the creation of truly inclusive transport systems.

• **Population data on beneficiaries of inclusive transport are difficult to verify because a "disability lens" only sees a portion of those who are helped and that portion is more difficult to measure.** Beneficiaries of inclusive transport include not only a large portion of those with permanent or temporary disabilities, but also large numbers of women (especially pregnant mothers or women encumbered with small children), seniors, children, and those with packages.

Consider, for example, the situation in Latin America. The author prepared a Latin American Situational Analysis for a British project[13] which included estimates for the total populations in continental Latin America, as of 2000, for seniors age 65 and over, and for women.[14] The source of the data was CEPAL, the Economic Commission for Latin American and the Caribbean, which presumably uses standardized data. However, the author had to very crudely estimate the population with physical, sensory, or cognitive disabilities, by averaging very *disparate* data from studies in nine countries which used different methodologies and definitions of disabilities, and may also have been affected by underreporting (by those not wishing to self-identify as disabled) or perhaps, in some cases, over-reporting (if some benefit was seen as coming from being reported as disabled).[15]

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[11] It is recognized that in reality even these "straightforward" numbers can be difficult to obtain.

[12] Low steps, priority seating, or the removal of narrow turnstiles are examples of inclusive design, while coming to a complete stop at bus stops and waiting for passengers to reach priority seating is an example of inclusive operation. See Attachment A of this paper for additional examples.

[13] Prepared in June 2002 as part of a project titled "Enhanced Accessibility for People with Disabilities Living in Urban Areas," sponsored by the UK's Department for International Development (DFID) for the benefit of developing countries. The complete Inception Report for this project is found at the DFID web site at www.transport-links.org or the AEI web site at www.globalride-sf.org.

[14] Seniors totaled 27.3 millions, or 5.4% of the population, while women totaled 256 millions, or 51.4% of the population, per the CEPAL data.

[15] Data averaged by author from P. Dudzik, A. Elwan, and R.L.Metts, *Disability in Latin America: A Review of Statistics and Inclusionary Policies*, an unpublished draft paper prepared for a March 16, 2001, seminar of the Inter-American Development Bank in Santiago, Chile, p. 9. Averaging the data

"United Nations data" that 10% of the population is disabled is at best a gross estimate. Technically, the figure is probably less in many countries, yet could be far higher in other countries.

In terms of passengers who especially *benefit* from inclusive design, the figure is certainly higher, as is noted by the European Conference of Ministers of Transport, which estimates "that at any one time between 20 and 30 per cent of people traveling have a mobility impairment for one reason or another."[16] This is probably true of other regions as well, when one takes into account the various design, operational, and safety issues which impact the ability of women, seniors, children, and other technically "non-disabled" populations to actually use public transport. Thus the number of people who are "*transportation* disabled" varies enormously *depending* on the design and operation of transport systems.

This problem is compounded by the lack of databases which blend together the "at risk" populations using public transport. While there are many databases on disability and development,[17] the author is unaware of databases which blend together the spectrum of beneficiaries who benefit from universal design. Measurements of the impact of inclusive transit need to especially consider disability, gender, aging, and school-age children. The same high steps that may stop a wheelchair user or someone with arthritis from boarding a bus, may also make the trip impossible for those of shorter stature (including many women and children) or less strength (frail elders).

• **It is difficult to estimate short-term transport demand based on estimates of persons with disabilities**. Transport demand depends on an accessible trip chain linking home to pedestrian path to transit stop to transit vehicle to yet another pedestrian path to a trip destination.[18] Accessible trip generators offering shopping, health care, employment, etc. are a key to demand estimation: disabled people need access to trip generators before they become motivated to use public transport. Also, persons who may not have used a bus during their entire lives need to overcome fears about what is, for them, a novel experience. For example, San Francisco, California, has safe, accessible, reliable, and affordable fixed route and door-to-door services which were thought to have matured several years ago to the point where they met the great bulk of public transport demand by those with

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resulted in an estimate that 6.5% of those living in continental Latin America were disabled according to the disparate data.

[16] *Improving Transport for People with Mobility Handicaps: A Guide to Good Practice* (Paris: ECMT, 1999), p. 7, citing studies in Germany and France. Looking at the issue from a different perspective, the USA's Bureau of Transportation Statistics estimates that "15% of adults in the US have a disability or health problem that makes travel difficult," of which one third were age 65 years or older.

[17] "Databases on Disability and Development," *Disability World*, June-August 2003, lists 16 databases which are "disability specific" or which address "health and development with disability component."

[18] Where transfers are made, the trip chain also includes linked trips involving multiple lines and perhaps multiple modes.

disabilities. Surprisingly, demand by disabled passengers has continued to grow but in some cases has become more difficult to quantify as "access features" have been increasingly used by other passengers as well.[19] This is a major concern, as initial use of inclusive transport features – if judged only by their use by visibly disabled persons – may be lower than expected while ultimate use may be higher than expected.

Because so many different factors affect the accessibility of public transport, performance measures for inclusive design and operation are best embedded in larger measures of overall system performance, which in turn may respond to the political, geographic, and economic environments in which public transport is provided. Put another way, there is no such thing as a high quality accessible transport system providing good service to passengers with disabilities when most other passengers are treated in an unsafe or discourteous manner.

• **Indicators relative to cost per trip tend to be subjective and readily politicized.** For example, while no group is more completely denied service by lack of a level change device than passengers who use wheelchairs to gain mobility, the relatively high cost per trip to exclusively serve wheelchair users by using on-board lifts tends to obscure the facts that (1) universal design approaches such as Bus Rapid Transit or low-floor buses assist a broad array of passengers and (2) more than nine out of ten disabled persons are not wheelchair users and benefit – *along with most other passengers* -- from such low-cost access features as non-skid flooring, large-print destination signs, or drivers trained to call out key stops. On the other hand, advocates of inclusive transit may understate costs, which can harm the dialogue which should occur between disability NGOs and the often privatized transport operators who understandably fear any changes which could increase their costs when they are locked into inflexible fare schedules and often have limited funding.

• **The use of indicators for inclusivity may run counter to a prevailing culture which values prevention over inclusion.** A recent World Bank Dialogue on Disability and Development[20] notes that accessibility is not integrated into

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[19] An example was the use of the kneeler feature, originally intended to focus on the needs of older or semi-ambulatory fixed-route passengers. Bus drivers in San Francisco soon realized that the feature improved boarding speed for all passengers and began to kneel their vehicles at any stop with several waiting passengers. The kneeler feature is now no longer thought of as a design feature meant for disabled passengers, since all passengers benefit from it. Meanwhile, door-to-door service demand has increased year after year to 1.2 million annual trips in spite of having been deemed to meet the "full need" several years ago at a level of some one million trips. Wheelchair users, for example, have sharply increased their use of door-to-door services while gradually increasing their use of fixed-route services as well. These service levels could not have been predicted twenty-five years ago when services were first initiated.

[20] "World Bank International Dialogue on Disability and Development, Helsinki, May 29-30, 2003," as reported in *Disability W*orld, June-August 2003. The report concluded that "There was general agreement that the disability and development landscape has been characterized by small, fragmented, unsustainable projects; a disconnect between disability and mainstream development efforts; a 'flavor of the month' approach to country focus; preoccupation with prevention, to the

mainstream development projects. The resulting report states that "the cost-benefit of disability prevention programs has been well established, while the obviously significant economic costs of excluding at least one tenth of the population from development has yet to be precisely calculated."[21] The report concludes that "a high priority is to establish a core set of accessibility standards for development planning and projects, with the ultimate objective of making all development work accessible through universal design."

• **The recent emphasis on inclusive transport occupies an intersection between the interests of urban infrastructure workers and social development workers. These two groups understandably look at indicators and performance measures from different perspectives.** A brief search of data from Living Standards Measurement Studies (LSMS) of the World Bank may illustrate this concern. Though only a cursory review, the author found transport questions formed in a manner unhelpful for those wishing to draw conclusions about inclusionary practices. Typical is a question asked in Armenia which lists "transport difficulties" as one of five boxes to check to determine the main reason why a person of school age does not attend school, although no question relative to disability is asked. In Ecuador, an LSMS survey includes a box marked "medical center is far away" as a reason "why someone did not go to a doctor or a medical center." Whether the difficulty of reaching a school or a medical center is the result of lack of access to existing transport remains unclear.

Transport "pops up" in a host of studies, usually in a haphazard way. Picking one study at random, the three factors shown to be most decisive in determining the outcomes of childbirth amongst poor people in an African country are (1) delays in seeking help, (2) delays in reaching a treatment facility, and (3) delays in receiving adequate treatment at the facility.[22] Clearly, access by pregnant women to public transport may be a crucial component but we are unable to quantify the degree to which this is so.

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The key issues discussed above remind us that in any new field there is work to be done to clarify our understanding of the challenges and arrive at simple and

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exclusion of rehabilitation and inclusion; 'exclusion by design' in mainstream projects; and poor coordination, evaluation and knowledge-sharing." (p. 4)

[21] Studies have shed some light on the economic costs of exclusion. When disability is defined as a really serious physical problem, as in a survey done in Brazil, the participation of the disabled population in the labor market is less than half of the non-disabled population. "Estimating the foregone earnings of the disabled population without controlling for a possible sample selection bias, . . . there would be 0.6% and 0.9% more earnings in Brazil and Costa Rica respectively, if the disabled population had a similar participation rate (to) the non-disabled population," according to a paper submitted to the Inter-American Development Bank by Gonzalo Hernández Licona and cited in "Disability and the Labor Market in Latin America," *Disability World*, Issue No. 9, July-August 2001, p. 12.

[22] Ndola Prata, et al., "The Value of a Mother's Life: What Will it Take to Meet WHO Standards?" (UC Berkeley)(check)

broadly agreed upon methods to measure results. The rapidly emerging field of inclusive public transport is no exception. On the one hand, the implementation of indicators and performance measures for accessible public transport may be more complex than would be wished by the various stakeholders. On the other hand, the resolution of these issues may lead practitioners to understand that the monitored results of inclusive transport address the needs of more people than initially realized and will ultimately result in greater "public goods" than first anticipated.

Recommendations

The comments in this working paper lead to a number of related recommendations which practitioners may wish to review for relevancy to their own situations.

1. A simple internationally accepted instrument to measure the functional limitations of persons confronted with a disabling environment (e.g., when dealing with steps of given heights in bus entrances) would provide a helpful yardstick for estimating the overall impact of universal design features. Research over the years in Europe and North America has already resulted in an increasing consensus regarding the percentages of individuals who are unable to travel when faced with one or another defined barrier to transportation. The results of this research are having a positive impact on an emerging global consensus as to what the standards and guidelines for accessibility to public transit need to be.

2. The measurement of functional limitation needs to be extended to embrace all categories of passengers benefitting from design and operating features which remove barriers to travel. It would be especially helpful to aggregate the different categories of beneficiaries to promote more standard estimates of benefits for use at national or regional levels.

3. Experience in developing countries needs to be monitored to develop more ability to predict long-term growth in transit use by cohorts of passengers who will benefit from universal design and safe operating procedures. For example, passenger profiles of accessible Bus Rapid Transit systems[23] could be compared with those of less-accessible bus and small-vehicle systems in Latin America, Asia, Africa, and eastern Europe. It is predicted that the passenger profile for a matured exemplary system such as found in Curitiba, Brazil, would turn out to be far more inclusive -- in regard to gender, disability, and age -- than the typical passenger profile for the less-accessible bus or small-vehicle systems found in locales throughout the developing world. The changes in passenger profile resulting from inclusive design and operation may become more predictable as a body of experience is built up based upon actual measurements. Ultimately, defined changes in the passenger

[23] Accessibility of course must extend to pedestrian infrastructure leading to BRT stops and to the major trip generators served by these systems. Thus BRT systems need to be compared to each other as well.

profile of a public transport system could be used as a key indicator that design and operational changes were in fact being rigorously implemented.

4. A passenger profile should ideally be taken before access improvements are made, and then periodically after taking steps to implement inclusive transport systems.

5. Indicators and performance measures should be prepared early in the planning process. For example, performance measures should be included in invitations for transport concessionaires to provide services, or in requests for proposals for supplying transport vehicles or infrastructure. Some flexibility may be advisable, so that potential concessionaires and proposers can negotiate phase-in schedules or modest modifications with transport or regulatory authorities. Agreed upon standards and performance measures can then go into the contractual language as binding criteria during the life of the agreement. This is important to all parties to a fair agreement. Requiring unanticipated performance levels in the middle of an agreement, without compensation, can weaken a concessionaire's income stream and impair its ability to perform.

6. At a minimum, in situations where concession agreements have been previously lacking or not well enforced, performance measures should be gathered on the basis of (1) the concessionaire meeting initial requirements for access features and for training of staff in safe operation and courtesy to disabled passengers; (2) enforcing ongoing maintenance of access features and safe and courteous operation through periodic inspections during the life of the agreement, and (3) setting up procedures for passengers to commend good practice and complain about poor practice, either in person, or by phone or mail where available.

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Attachments

Attachment A – Examples of inclusive design and inclusive operation

From PRS Transport chapter 4.5.5 *Mobility for the disabled poor* (World Bank), prepared by Thomas Rickert, Access Exchange International, Sept. 2001

Most of the design features and operational practices which assist disabled passengers also assist all other passengers. They are often very low cost. Examples include:

1. Vehicle and infrastructure design features:

- Vehicle design should include large print destination signs to assist those with visual impairments; prioritized seats for disabled and elderly passengers; adequate hand grips and plentiful vertical stanchions at doors and inside vehicles, painted in a bright contrasting color; non-skid materials for step and floor surfaces; and, where feasible, a retractable first step at a bus entrance (or a movable stool) to assist semi-ambulatory passengers.

- Transit terminals and stations should have well-located signs with high-contrast large print to assist deaf and visually impaired passengers or with icons to assist passengers who cannot read; a low ticket counter for use by wheelchair users and short persons; tactile guideways, where appropriate, to and within transit terminals and stops, and tactile warning strips at curbs and platform edges to assist blind persons.

- Unpaved bus stops could be made more accessible with a short (e.g., 2 meter) yellow curb piece, thus helping blind persons to position themselves behind the curb piece, persons with reduced vision to see the stop marker, and persons with reduced mobility to step up on the curb piece as a way to reduce the distance to the first step of the bus (usually the most difficult step to reach).

- Pedestrian pathways and buildings serving the public should incorporate inclusive design (level pathways of adequate width, curb ramps serving wheelchair users and all other pedestrians, ramps to public buildings, accessible bathrooms, etc.), noting that new construction can be made accessible at relatively little cost compared with retrofitting old construction. Village roads, tracks, and paths should be kept free of obstacles and maintained in as accessible a state as possible.

Nearly all of these low-cost features also benefit all other passengers. There are also a variety of measures to provide access for passengers using wheelchairs, some of which are low-cost (policies permitting friends to assist a wheelchair user into a vehicle and fold his/her chair, ramped wayside platforms at key sites), others with greater cost (such as lift-equipped buses), and others of varying costs which serve all passengers (such as low-

floor buses; or high-floor “Bus Rapid Transit” vehicles with bridges serving all passengers from high platforms, as in Curitiba, Brazil; Quito, Ecuador; and Bogotá, Colombia).

2. Operational practices for passengers with disabilities also tend to assist all other passengers. These include:

- Establish regulatory mechanisms to enforce safe vehicle operation by private and especially informal sector transit operators, and establish positive and negative reinforcements to encourage safety and courtesy to all passengers

- Provide sensitivity training to transit personnel (including bus drivers and fare collectors) so that they will have direct experience of what it is like to use a wheelchair or crutches for mobility, to board a bus when blind, etc.

- Require that buses and jitneys come to a complete stop at bus stops and remain stopped until passengers have entered and positioned themselves for their ride

- Require drivers to call out key stops and require audible announcements at transit terminals, as an aid to passengers who are blind or partially sighted

- Disaggregate data on bus accidents where possible, to gain public support for key safety practices related, e.g., to injuries while trying to board a moving vehicle, injuries while crossing traffic lanes to get to a vehicle, or on-board injuries due to bad driving. Elders are far more likely to suffer severe injuries during a fall or accident than are other passengers suffering the same fall or accident, but specific data in each country will assist in quantifying this problem.

- Explore increased employment of women as potentially safer bus drivers.

- Consider alternatives to paying drivers “per passenger,” to remove the major incentive for unsafe operation.

Attachment B – Examples of indicators used in a large door-to-door system

The requirements of an agency with a small number of vans are quite different from those of a large door-to-door system. Over the past 25 years, San Francisco, California, has evolved a door-to-door system providing over a million trips per year to nearly 12,000 active riders. San Francisco collects data in the following categories:

Indicator category	Examples of data collected
Service level data	- total trips by mode (e.g., lift-equipped vans, group vans, regular taxis, ramped taxis) and by company, collected monthly - group van data, includes total trips for each social service agency receiving service. - total weekday and weekend trip data
Efficiency data	- "no show" trips by mode and company, in absolute numbers and as a % of total trips, to evaluate how to reduce the number of trips cancelled upon arrival of vehicle. - revenue miles and hours per month, by mode - passengers per revenue vehicle mile and hour - revenue vehicle miles per revenue vehicle hour
Reliability data	- on time performance by mode – lift van, group van, taxi, and missed trips - on time performance by window (on time, 15-30 minutes late, 31-59 minutes late, & 60+ minutes late) - complaints, by type, per month (late, missed trip, incident, reservation, dispatch, etc.) - compliments, by mode, per month
Rider certification data	- total riders in database - total active riders - total active riders by mode - total certifications completed - total recertifications completed - total certified riders with full eligibility - total certified riders with conditional eligibility - total denials of eligibility - total appeals of denials of eligibility - total second-level assessments (by professionals, by in-person interviews, via telephone interviews)
Financial data	- costs, by mode, of broker supervising participating companies providing door-to-door service - cost per passenger trip - total fares collected - average fare per passenger - ratio of passenger fares collected to total service cost

Attachment C – Examples of indicators used in a large multi-modal system

San Francisco's performance measures could be found in well-run systems around the world. Indicators such as these can be compared against the same period for the prior year, or against an average for prior years, and could also be compared against a measurable objective for the current period.

Category	Typical indicators now in use by fixed-route modes (bus, trolley coach, rail)	Comments on indicators relative to inclusivity
System Reliability (partial listing only)	• on time performance • passups due to overcrowding (no following vehicle within 3 minutes) • peak period passenger load factor • headway adherence	The four indicators at left are especially important for disabled passengers who may have difficulty standing and waiting at bus stops, or traveling on an over-crowded vehicle. In addition: • Designated staff conduct monthly inspection of a sample of vehicles to verify that maintenance staff have maintained wheelchair lifts, securements, and other access features at designated levels.
System Performance	• passengers carried by mode • fare revenues generated by mode • hours & miles operated by mode	
Staffing Performance	• expenses incurred by mode • vacancy rate • staff attrition	
Customer Service	• marketing plan developed • complaint resolution • operator training • crime incidents • schedules published • annual passenger survey • improve passenger information • accident reduction	• A special brochure for disabled passengers is periodically updated and distributed • Monitors all complaints, including those by passengers with disabilities • A sample of operators is requested by designated staff to operate wheelchair lift in revenue service to verify proper training (monthly) • While the indicators at left monitor service for all passengers, women and passengers with disabilities are especially assisted by measures to reduce crime incidents and to reduce on-board accidents.
Employee satisfaction	• employee education & training opportunities • security, health, & safety training • average years of service, by job category	Well-motivated employees are more likely to provide courteous service to all passengers, including those with disabilities.

Attachment D– Examples of indicators used in a large commuter rail system

The Bay Area Rapid Transit (BART) system in California uses indicators to measure features which effect all passengers, although several indicators have special relevance to passengers with disabilities. These indicators are taken from BART's quarterly Passenger Environment Survey (PES). Indicators are rather arbitrarily distributed by the author under categories of accessibility, safety, and reliability, noting the overlap between these categories in a well-run system.

Category	Indicators
Safety (includes aspects which affect perceptions of safety)	- police personnel observed in stations - police personnel observed in parking lots/garages - police personnel observed on trains - station cleanliness - parking lot cleanliness - graffiti indicators (interior, exterior) - train cleanliness
Accessibility	- restroom cleanliness - elevator cleanliness - brochures in kiosks - agent availability - agent in uniform (or with name badge) - arrival announcements - transfer announcements - destination announcements ("one observation per train car while traveling between two adjacent stations") - temperature on train
Reliability	- % time elevator in service throughout quarter (continuous monitoring) (and posting of out of service elevators to forewarn passengers, and provision of alternative transport (where possible). - train on-time performance - customer on-time performance (arrive within 5 minutes of published schedule) - elevator availability (escalator to street)(to platform) - fare gate availability - ticket vending machines availability