

Improving the Customer Experience

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Transport for London

Introduction

Customer perception of transit service is traditionally informed by the agencies' ability to run trains and buses frequently, on time and without disruption. Today more than ever, transit agencies are striving to provide more than this basic service; they aim to grow and diversify their customer base by providing a convenient, attractive and comfortable transit experience – so good, in fact, that transit then becomes the first choice for travel. A variety of elements go into making an attractive transit experience – everything from communication to facilities that are comfortable and easy to navigate, with seamless transfers.

This white paper explores how the seven cities participating in the Transit Leadership Summit are addressing the customer experience in Hong Kong, Montreal, New York, Seoul, Singapore, Vienna and Washington, D.C. It investigates the transit agencies' activities and experiences with respect to communication, stations, vehicles, and accessibility. Although the nature of transit provision and its perception by customers differ due to local context,¹ the elements covered in this paper – communication,

station and vehicle characteristics, accessibility – can go a long way toward improving the customer experience and increasing the attractiveness of transit.

How Agencies Communicate with Customers

Providing good information about available services is an essential aspect of successful public transportation systems,² and is a strong factor in helping customers decide to use transit for business or leisure trips.³ The type of information provided can be divided into the following categories: pre-trip, wayside (provided when a trip is underway; often found outside or inside a transit station, on a platform, or at a roadside stop), and on-vehicle.⁴ Commuters and visitors have different requirements for what information they need from the transit agency. These needs also shift based

¹ Felleson and Friman 2008

² Balcombe et al. 2004

³ Farag & Lyons 2011

⁴ Cluet et al.

Figure 1: Screen grab from AMT's new website



<https://votrenouveau.amt.qc.ca/fr>

Figure 2: Washington Metropolitan Area Transit Authority website



<http://www.wmata.com/>

on normal service, planned service changes and disruptions. Information – especially pre-trip information – is particularly crucial to travelers making multimodal trips.⁵ The elderly have a substantially greater need for information in all stages of travel, in order to save physical effort. In addition to transmitting information to customers, transit agencies must also be able to receive feedback from customers to improve service. All seven transit agencies transmit and receive information using various channels, including electronic (websites, mobile applications, social media), and physical (real-time vehicle arrival displays). These tools have evolved dramatically in recent years, especially with the advent and proliferation of real-time technology. Just as it was hard to foresee the advances that communications would make in the last few years, it's difficult to predict how this field will continue to change in coming years. One thing, however, is clear: it is important for transit agencies to stay abreast of these developments.

Trip Planning

Customers can plan trips using printed timetables and maps, or electronic resources such as websites and mobile applications. Trip planning is a constantly evolving field. Static content, either printed (e.g., timetables and route maps) or electronic (websites), is complemented by more dynamic content in websites and apps (often provided by third parties) and public display signs. In practice, the line between pre-trip and wayside information has blurred in recent years, as customers use real-time information to modify their travel plans (for example, changing lines on a metro as they learn of unexpected service changes). Although printed material is still preferred by many passengers for pre-trip planning,⁶ this section focuses on electronic resources.

To plan their trips, transit customers want information about overall travel times (including walking distance at origin and destination), transfers, route alternatives, and irregular events that may disrupt a journey. Some also want to know about express and local service, park-and-ride facilities, bicycle parking, etc. Assisting customers in trip planning is a major service of transit agencies; helping people get the best use out of the system is critical, not only for those that use the system regularly, but also for visitors to a city.

Agency Websites

Transit agency websites typically provide information and services that include system maps, transit schedules, fare information, planned service changes, customer service questions and trip planning tools. Although an increasing number of customers are using mobile applications (covered in the next section), websites are still an important source of information for many.

Most agency sites include real-time service information, which informs customers about the status of the service – whether it's normal, delayed or suspended. In some cases, planned service disruptions are also indicated. This information is made available for web applications and in other formats – for example,

⁵ Grotenhuis et al. 2007

⁶ Cluet et al. 2003

Figure 3: Google Maps directions from Hong Kong, Washington D.C. and Vienna.

Source: Google Maps

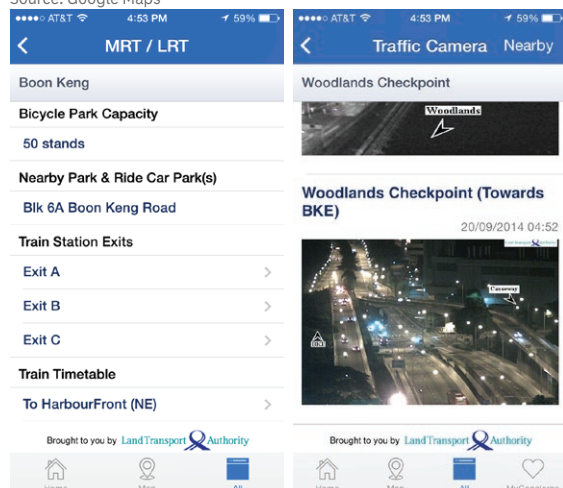
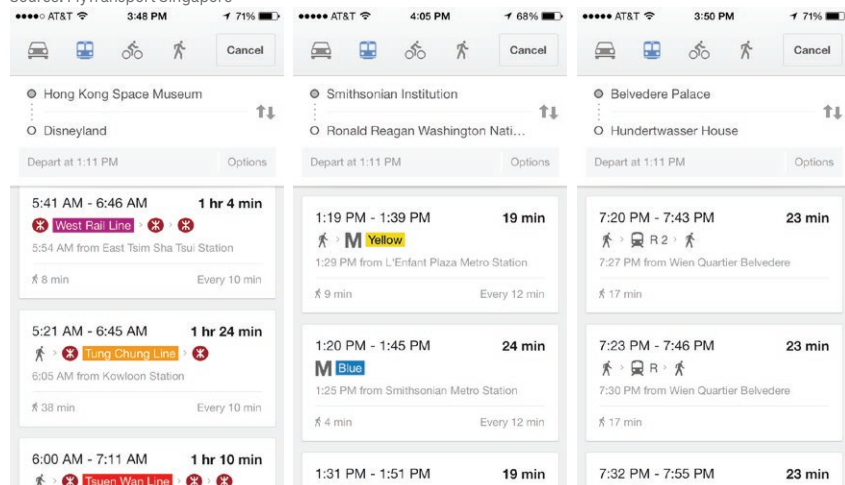


Figure 5: Screenshots of MyTransport.SG with information for users of all different modes (left) and motorists (right)

Source: MyTransport Singapore



New York's Metropolitan Transportation Authority and London's Transport for London include this information on screens at some of their busiest station entrances.

Montreal's Agence métropolitaine de transport website is characterized by simplicity and clean aesthetics, which make it particularly user-friendly. Launched in April 2014, the central feature of the AMT website is a map on the homepage that is a trip-planning tool. This comprehensive map includes information on a wide range of services: trains, metros, buses, bike routes, bike and car share, park-and-ride, carpooling, and electric car charging stations. Customers can also use the site to order monthly tickets, and find out about accessible transportation for people with disabilities.

The agencies' trip planning tools offer different types of information. Vienna's Wiener Linien planner allows a user to enter his origin and destination points as a specific station or as an address. Seoul Metropolitan Rapid Transit's planner requires a specific station for the origin and destination. Hong Kong's

Figure 4: Transit App NYC. Nearby bus and subway options (left) and the location and availability of bike share (right)

Source: Transit App

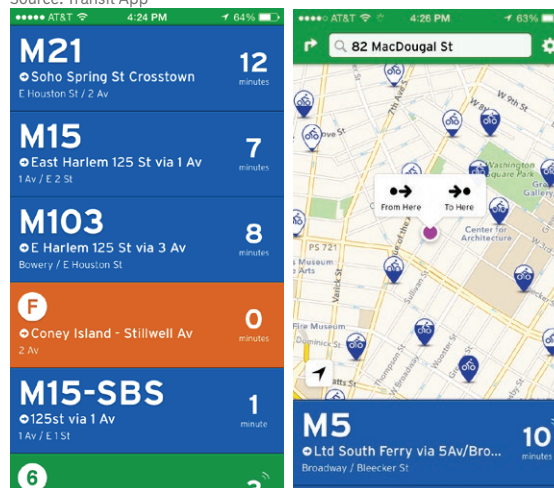
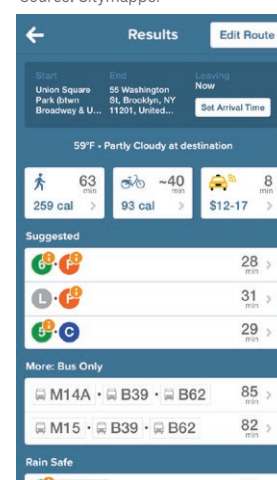


Figure 6: Screenshot of the Citymapper app

Source: Citymapper



Mass Transit Railway planner gives the option of entering specific station names or selecting from a pre-set list of attractions that includes "Arts & Culture," "Major Buildings," and "Shopping & Dining." In Washington, D.C., the Washington Metropolitan Area Transit Authority's trip planner integrates rail and bus services, providing itineraries, door-to-door fares, travel times, walking directions and transfers.

Although websites may traditionally be thought of as for the pre-trip portion of travel, viewed on computers at a home or office, in practice, they can also be accessed by mobile devices (smartphones), and as such can also be used when travel is underway. Further, transit customers can use websites to sign up for text messages (on cellphones) or emails (that can be read on desktop computers or smartphones) regarding transit services, as the WMATA does with its MetroAlerts program.

Besides their own websites, agencies have turned to social media platforms that customers are already using to provide and receive information. All seven transit agencies have a Facebook

page. Vienna's Wiener Linien has almost 50,000 Facebook "likes."⁷ Vienna, Singapore, New York, Montreal and Hong Kong have at least one YouTube or Vimeo account. Twitter, another popular social media platform, will be discussed in further detail in the "Customer Feedback" section.

Mobile Applications

Transit agencies may find delivering real-time information to mobile devices relatively inexpensive versus public displays, which are costly to install and maintain.⁸ Some tools require only a cellphone; in New York, bus customers can send a text message to receive via text real-time arrival information. In recent years, mobile applications ("apps") have made dramatic developments. Used primarily on smart phones, apps have become an important tool for transit systems around the world, especially as smartphone use increases worldwide.⁹ Mobile apps allow a user to plan trips on the go, and many apps integrate real-time data feeds that update schedule and service changes. As such, apps are useful for both pre-trip and wayside portions of travel. The popularity of many apps, particularly those made by third-parties, is due to their ability to incorporate information from various sources into a single tool.

Singapore LTA's MYTransport.SG is an award-winning app that incorporates all modes of land transportation.¹⁰ It provides cyclists with a list of cycling paths, which includes length, connecting paths and bike parking capacity. Transit users can look up a train station and see train schedules, trip fare, journey time and places of interest at different station exits. Bus users can get real-time bus arrival times and a list of specialized bus services, including night, shuttle and premium buses. Motorists can view live traffic congestion information, up-to-date electronic road pricing rates, and park-and-ride locations. The app is also a platform for customers to send data back to the LTA. With the app's Snap & Send feature, users can take a photo of a road defect, such as potholes or broken traffic lights, pinpoint the location on the map, and send that information to the agency. This allows the LTA to inform travelers of current conditions and improve service more quickly.

Tools such as Google Maps integrate transit data from various cities and countries. Thus, someone who has already downloaded that app (or is viewing the website) can use the same interface in multiple locations without having to consult various websites or download a specific app for a particular city.¹¹ Over 800 cities, including the seven cities in this report, publish their data in General Transit Feed Specification and take part in the free Google Transit service, which allows the information to be integrated into Google Maps. Some agencies now also provide real-time data feeds, allowing apps and websites to incorporate service disruptions, planned or unplanned.¹²

New York's MTA has its own apps, such as SubwayTime, which is available for a select number of subway lines. It gives up-to-date subway arrival times before a user gets to a station or platform. Like many other transit agencies, in addition to its own apps, the MTA publishes its transit data in GTFS so that third-party developers can create apps that present data in an interoperable way. The MTA actively encourages these independent developers; in 2013, the MTA launched a competition for third-party apps called "App Quest," and received over 50 submissions, including Citymapper and Transit App NYC.¹³

Citymapper integrates schedule data with travel disruption alerts, transportation cost, caloric comparison (calories burned using various transport modes) and weather information. Users can enter their start and end destination on City Mapper and compare travel time by foot, bike, transit or taxi; calories burned for walking and bike; and price difference between transit and taxi. City Mapper also uses a phone's location data to alert users when it's time to get off the bus.¹⁴

Transit App NYC uses location data and simple text, graphics and transit-matching colors to help users quickly identify the closest transit options and their scheduled arrival times, and real-time transit information if available. The schedule information can also be cached, which allows a user to access even if a phone or wireless connection is not available.

Real-time Information: Public Station Displays, Announcements and On-Vehicle Displays

Information for customers who are underway is most useful when it is in real time. Ways to deliver this information include via mobile devices (cellphones or smartphones), public display signs and audio messages. For transit customers without real-time information, perceived wait time is greater than measured wait time; riders using real-time information via mobile devices do not perceive their wait time to be longer than their measured wait time, with a difference of about 30 percent in perceived wait times.¹⁵ Users of real-time information wait about two minutes less for transit than those that do not use real-time information.¹⁶ There are seven main effects of real-time information displays: reduced wait time, positive psychological factors (including reduced uncertainty, increased ease-of-use and a greater feeling of security), increased willingness-to-pay, adjusted travel behavior such as better use of wait time or more efficient travelling, effects on mode choice, increased customer satisfaction and, finally, a better image of transit service.¹⁷

The seven transit systems studied showed varying rates of coverage of public display signs with real-time vehicle arrival. These signs are often placed inside of transit stations only, although having such signs outside stations and at surface transit

⁷ <https://www.facebook.com/wienerlinien>

⁸ Schweiger 2003

⁹ Google's Mobile Planet data puts penetration for these devices at 73 percent for Korea in 2013, ranking second of 50 countries. The statistics for the other six countries in this report are Singapore 72 percent, Hong Kong 63 percent, Canada and the USA 56 percent, and Austria 48 percent. See <http://think.withgoogle.com/mobileplanet/en/>

¹⁰ In 2013, the app was awarded the International Association of Public Transport's Grow with Public Transport award for Integrated Mobility Innovation, edging out Germany's Daimler AG and the U.K.'s Transport for London apps. See <http://app.lta.gov.sg/apps/news/page.aspx?c=2&id=10114a57-0630-4602-92d6-ef78a4cdfc8>

¹¹ <https://code.google.com/p/googletransitdatafeed/wiki/PublicFeeds>

¹² <http://maps.google.com/landing/transit/cities/index.html>

¹³ <http://2013mtaappquest.challengepost.com/submissions?page=1>

¹⁴ <https://itunes.apple.com/app/citymapper-london-public-transport/id469463298>

¹⁵ Watkins et al. 2011

¹⁶ Ibid.

¹⁷ Dziekan and Kottenhof 2007

stops may have great utility for riders. For example, a customer may decide to hurry into a station or stop for a cup of coffee, based on the time a train, bus or tram will arrive.

In Seoul, all buses are equipped with GPS, and the real-time information regarding current location of all the buses in the routes is disseminated through display panels in the station or via apps. Transfer information between trains and buses is also well organized, and updated based on real-time information. Every subway station in Seoul has information display panels at the entrance, such that customers transferring from a bus can determine whether they should rush in or not. Singapore has also made real-time arrival information widely available, as has Vienna, at metro, tram and bus stations. Metro stations in Washington, D.C. have fairly simple digital information panels in the stations that show next train arrival times and system status.

Figure 7: Information panels at the entrance of a station in Singapore



Source: Dickson Phua (flickr)

Figure 8: Simple and clear signage at a metro station in Washington, D.C.



Source: James Byrum (flickr)

Figure 9: Transfer information panel at a subway entrance in Seoul



Source: Bobby Hidy (flickr)

In New York, the MTA has gradually installed electronic signs on platforms that show how many minutes until a particular train arrives. These are now available at 177 stations, but there are still 313 stations that lack them (about a 36 percent coverage rate). In February 2014, the MTA unveiled its first “On The Go” interactive wayfinding kiosks at Grand Central Station, a major intermodal transit hub. The touchscreens provide real-time information, including directions, service alerts and wait times. The MTA plans to install 90 kiosks throughout the subway system.¹⁸ LCD signs outside Grand Central Station proved very useful before, during and after a natural disaster (Hurricane Sandy) in 2012. Customers were able to receive up-to-date information on transit service, which was severely affected by the hurricane, from the signs.

Figure 10: On the Go Kiosk at Grand Central Station



Source: Control Group

Table 1: Platforms that Transit Agencies to Give Real-Time Information About Service Changes

City	Website	Agency App	Twitter	Text or E-Mail Alerts	Real-Time Information System
Hong Kong	No	Yes	No	No	Yes
Montreal	Yes	Yes	Yes	Yes	Select metro stations
New York	Yes	No*	Yes	Yes	Select subway stations
Seoul	No	Yes	No	No	Yes, including at aboveground entrances
Singapore	No	Yes	Yes	No	Yes
Vienna	Yes	Yes	Yes	No	Yes
Washington D.C.	Yes	No*	Yes	Yes	Yes

*No one specific agency app but agency provides data for third-party apps.

Besides websites, mobile applications and public display signs, audio messages can be an effective tool for communicating real-time information, especially regarding arriving vehicles and service changes. These should be delivered in a clear, uniform manner, easily heard and understood. These messages can be delivered in multiple languages to reflect local cultures (e.g., in Dublin, messages are delivered in English and Gaelic), or to help tourists (as in Rio de Janeiro, where information is delivered in Portuguese and English). Just as high-quality audio messages improve customer orientation, low-quality audio disorients customers. These messages should be supplemented by visual

¹⁸ <http://www.controlgroup.com/mta.html>

displays to serve customers who are deaf or have partial hearing loss – a group that will likely continue to increase in number as urban populations around the world age.

Vienna is a standout regarding audio announcements; the Wiener Linien implemented a project to improve all acoustic communication media in 2012. The messages were improved in terms of wording and clarity, re-recorded using the voice of a popular actress (Angela Schneider), and uniformly introduced across the entire network.

The information available for the on-vehicle portion of travel has evolved greatly in recent years. Most on-vehicle displays used to provide minimum information, such as static route maps and printed timetables. Today, many on-vehicle displays truly orient customers, with key stops, real-time frequencies and connecting service information.¹⁹ Further, audio messages often reinforce the information available on the screen, such as announcing the next stop. This information can be of great utility to all transit customers, especially those unfamiliar with their route.

In Vienna, the next station's name is displayed inside all transit vehicles – trains, trams and buses – together with audio announcements. To help passengers identify their destination, Hong Kong's MTR is rolling out an on-board Electronic Bus Stop Announcement System that provides voice announcements and LED displays.

Customer Feedback

Besides providing information to the public, many transit agencies strive to create opportunities for the public to provide feedback to the agency. In the past, agencies solicited feedback using customer forums, call centers and surveys. Today, many also use websites, apps and social media to capture feedback. Agencies can use these interactions to inform short- or long-term changes, or provide better information on a particular question, issue, comment or complaint. Like the other aspects of communication mentioned in this section, this area has evolved dramatically in recent years. Call centers were traditionally the main way transit agencies received feedback, then websites became an important way to receive information and feedback; in the last two years, social media such as Twitter have risen in prominence. Interestingly, social media can improve direct contact with customers, e.g., customers may receive more personalized attention via Twitter than if they speak to an agent at a call center or fill out an online form. Just as the recent rise to prominence of social media was difficult to foresee, it is difficult to predict what customer feedback mechanisms might emerge in coming years.

In Hong Kong, the MTR's website provides a hotline number, and customers can also submit complaints and suggestions via fax, mail or an online feedback forum. The MTR also actively seeks customer feedback via its "Opinion Zone" and "Voices of the Customer" surveys. "Opinion Zone" is a branded activity organized at different stations for two evenings per month and

on trains twice a year. The VoC surveys poll customer interests, expectations, issues and concerns on either a specific initiative or general service.²⁰

In March 2012, MTR launched the HK\$1 billion (\$130 million) "Listening × Responding" program, which formulates initiatives that respond directly to customer requests regarding issues such as crowding, reducing wait times for trains and enhancing station facilities to improve access. For example, based on customer feedback, more staff will be deployed at stations to help smooth passenger circulation and provide assistance to passengers.²¹

Recently, Seoul's MTR has organized a Citizen Monitoring Committee to monitor, advise and participate in many activities regarding customer service enhancement. It consists of many citizen experts in various fields of urban rail operation. Washington, D.C.'s WMATA hosts "Metro Lunchtalk Online" chats, which give customers the opportunity to present questions and comments to the general manager and other top staff.²² WMATA's board and committee meetings also provide an opportunity for members of the community to comment. Such forums have the ability to bring customers, management and staff together in meaningful ways, versus more passive ways of gathering feedback, such as call centers.

Social media platforms such as Twitter allow transit agencies to be more transparent about their process. Instead of responding to an individual, information can be shared with many people at once. Except Hong Kong's MTR, all of the studied transit agencies have at least one Twitter account. WMATA has four Twitter accounts for rail, bus, general information and transit crime prevention tips and updates.²³ New York's MTA has various social media feeds for its different divisions, including New York City Transit, Long Island Rail Road, Metro-North Railroad, Bridges & Tunnels, and Arts for Transit.²⁴

The MTA's general Twitter account has more than 171,000 followers.²⁵ The agency uses this account as an information portal, and as a way to respond directly to customer issues and questions. For example, in the image below, a customer asks what to do to report a lost item.

²⁰ http://www.mtr.com.hk/eng/sustainability/2010rpt/sr10/building-consensus_services.php

²¹ http://www.mtr.com.hk/eng/publications/images/business_overview_e.pdf

²² http://www.wmata.com/community_outreach/lunchtalk_online_chats/

²³ http://www.wmata.com/rider_tools/metro_service_status/connect_with_twitter.cfm

²⁴ <http://web.mta.info/social/>

²⁵ <https://twitter.com/mta>

¹⁹ The LCD displays in trams in Bern (Switzerland) are a standout, showing upcoming stops in real-time and all connecting services available at those stops.

Figure 11: Twitter exchange between New York MTA and a customer



Twitter users often use “hashtags” (the “#” symbol) in front of relevant words or phrases in their Tweets to categorize those Tweets so that messages can be easily searched using keywords (e.g., #transit or #nycsubway). Agencies can thus easily categorize relevant messages. In New York, the MTA has found categorizing hashtags to be an effective way to identify customer issues with the transit system; this has allowed the agency to resolve issues with the system more quickly.

While the recent advances in communication have been dramatic, particularly regarding mobile technology, transit agencies would do well to remember that simple communication strategies that do not require access to mobile devices are still important. In some places, access to mobile devices may raise concerns of equity – in terms of income (these devices and services can be prohibitively expensive for some segments of the population) and group (for example, uptake of this technology may be low among seniors²⁶). Further, there may be cultural reasons or personal preferences that lead to low use of mobile devices. Consider that Vienna is in a country that has a relatively low penetration rate of smartphones (48 percent); however, the agency seems to be very capable of delivering its messages to customers. Besides ubiquitous real-time information, Vienna’s transit system has nine well-organized information centers at transfer stations to guide passengers. These ways of transmitting information may be more appropriate for customer preferences in that city. There is an emphasis on agency staff interactions with customers in cities where smartphone penetration is very high, such as in Seoul and Singapore. Personal customer service may be an effective way to counteract possible equity issues that the widespread use of newer information technologies might imply. As such, it is important that agencies concentrate on delivering and receiving information in the best way possible, rather than get fixated on a specific type of technology.

²⁶ 73.7 percent of Twitter users worldwide are aged 15 to 25 - <http://www.beevolve.com/twitter-statistics/#a2>

In The Stations: Design, Wayfinding and Other Customer Amenities

For many people, particularly newcomers to a city, entering a public transportation system is an intimidating, even daunting experience. Often, transit users find themselves amid rushing torrents of people, in a labyrinth of corridors and stairs, and faced with a confusing constellation of signs. One of the main tasks for agencies that seek to make their systems more customer-friendly is to make the journey to and from trains easier and more pleasant. Good station design and wayfinding can significantly improve customers’ perception of a transit system, as can amenities such as Wi-Fi, phone reception, platform screen doors and public art. While this section mainly explores elements of metro stations, these lessons can easily be transferred to any type of public transportation facility, including facilities for trams, buses, ferries and other modes.

Station Design

The path a customer takes from the street to a metro platform is fundamental to his or her experience of the system. Stations can grant direct access to nearby destinations, such as important office buildings or shopping centers. Distances should be kept as short as possible, in order to reduce the time and effort spent. Changes in elevation should be minimized, and when unavoidable, escalators and lifts should facilitate movement, especially for people with special needs – the elderly; people with children (and strollers), luggage, bikes or other bulky items; and wheelchair users (this issue will be discussed further in the section on accessibility). Spaces should be uncluttered, easy to navigate, with clean aesthetics to help customers feel at ease.

When discussing station design, it is illustrative to reference two recent examples: King’s Cross in London and Nuevos Ministerios in Madrid. A major intermodal hub, King’s Cross integrates two intercity and suburban rail stations (King’s Cross and St. Pancras) with six tube lines (it is the busiest tube station in London), over 15 local bus routes, and six bicycle share stations with over 400 public bike spaces. Formerly described as “depressing,”²⁷ the station underwent a major renovation that was completed in March 2012. This project involved extensive restoration and re-use of existing elements, as well as newly built features, transforming an unwelcoming place into a modern transport superhub. The train sheds have been decluttered, a new customer service center and restaurant installed, and once-dormant tracks re-activated. Platforms were enlarged, and all now connect to the centerpiece of the project, an impressively designed superstructure on the western concourse that protects travelers from the elements. Access to the superhub is facilitated by numerous points of entry and exit that make the station

²⁷ Europa Nostra Awards 2013, <http://www.eurapanostra.org/awards/108/>

particularly porous, and thus convenient and comfortable for travelers going to its many different destinations. The renovation won a Europa Nostra prize for conservation in 2013.

Figure 12: King's Cross.



Source: europanostra (flickr)

Nuevos Ministerios, the third busiest station in Madrid, integrates three metro lines with seven regional commuter rail lines and over ten urban bus routes. The station has direct service to the Madrid-Barajas airport, and as such is an important transit hub for air passengers as well as local customers. Wide passageways, and ubiquitous escalators and elevators make it ideal for air travelers, even if they have two pieces of rolling luggage. Open vistas, clean aesthetics and an intuitive layout make it easy to navigate for all types of users. Its large open spaces also lend themselves to cultural events, such as the concerts and dance performances regularly held there.

Figure 13: Nuevos Ministerios Station.

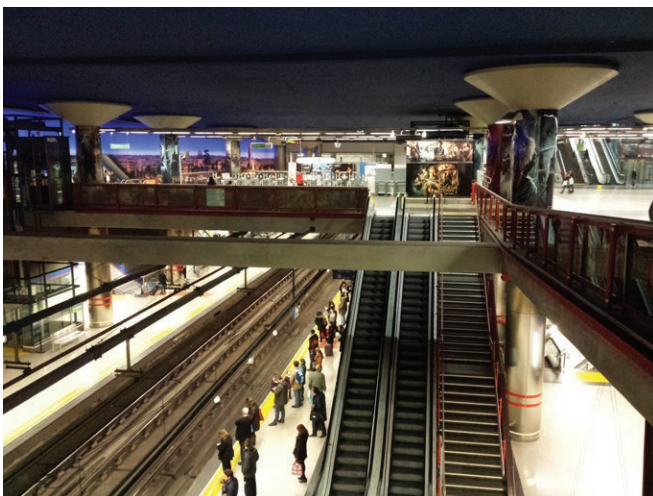


Photo: Jesuskyman (flickr)

Numerous stations in Singapore have excellent design, comfort and convenience. Singapore's LTA makes a special effort to make travel and shopping convenient by tightly integrating bus interchanges with metro stations and shopping malls. The six existing transport-shopping hubs will be joined by a new one in Bukit Panjang in 2015, with an additional six integrated transport hubs to be implemented over the next 10 years. Pedestrian

comfort is also an important priority for the LTA, with a program underway to provide a total of 200 km of sheltered walkways within 400 meters of all metro stations by 2018.

Opened in 2012, Singapore's award winning²⁸ Marine Bay metro station makes maximum use of natural light to illuminate underground levels, and permits views from the hall below up to the sky. The station is seamlessly integrated into an underground network of pedestrian walkways, and has connections to bus and taxi services. While the station has a strong visual identity, it blends in well with the park that surrounds it. Reflective pools in front of the station entrance are covered by a canopy; these are not only aesthetically pleasing, but act as rainwater collectors and create a cooler microclimate that offers metro customers greater comfort. Inside the station, large open areas and a clean aesthetic enhance the customer experience.

Hong Kong's Central Station, another standout, is one of the city's major transport hubs, and connects a dizzying array of services: four metro corridors, an airport express train, numerous trams, regional and urban buses, and ten ferry lines. Some of these services are connected via an extensive network of covered walkways – for example, the airport express train is at the nearby Hong Kong Station, and a major ferry pier is also a short walk away. The line between the public and private sectors is blurred at Central Station, as many of these walkways are surrounded by retail spaces and include entrances to office buildings. The station has three levels, but ubiquitous escalators ensure that customers do not have to expend great amounts of energy to reach their destinations. The MTR has also improved connectivity for passengers and enhanced station environments by changing the configuration of the Kwun Tong Station; major renovations are underway at other important hubs.

In New York, the MTA has been renovating Fulton Center, with a current total project budget of \$1.4 billion. Ten subway lines meet at the station, including a previously confusing assembly of stairs and passageways. The new Fulton Center includes a highly visible aboveground entrance, new passageways, a sizable area for retail and a simplified layout for easier navigation. The underground Dey Street Passageway connects Fulton Center to the World Trade Center and Courtland Street stations, facilitating connections for customers from the PATH system,²⁹ and on the N/R subway lines, respectively. The renovation expanded the capacity of the 4/5 subway lines by adding space to the platforms. Restoration of the adjacent historic Corbin Building was completed in 2013, and it has been integrated into the station. Escalators, elevators and ramps have been added, making the station accessible to all customers. Fulton Center is scheduled to open at the end of 2014.

The stations covered in this section include the following elements in their designs: large, open spaces that facilitate air flow and vistas, comfortable vertical circulation for customers with ubiquitous escalators and elevators, seamless connections to other transit services and the street for intermodal trips, access to shopping and restaurants, and thoughtful aesthetics. Creating such appealing environments can help create a sense of

²⁸ The station won the Small Project Award at the World Architecture Festival in 2012, and the International Association of Public Transport's Grow with Public Transport award in the Design Innovation category at the Asia Pacific Level.

²⁹ PATH is separate metro system that operates in the neighboring state of New Jersey, as well as in New York.

place, transforming formerly utilitarian stations into destinations for visitors, and uplift the daily experience of regular transit customers.

Platform Screen Doors

Platform screen doors have many benefits, including safety, noise and climate control. PSDs are becoming much more commonplace, and are now standard equipment on world class metro systems. They usually consist of a wall of glass that stands between the open tracks and the platforms. When a train enters the station, it lines its cars up with doors in the glass wall, which then open to let passengers on and off. PSDs increase safety because people can no longer easily be pushed or jump in front of arriving trains. PSDs also:

- Save cleaning costs by preventing trash from entering the tracks
- Reduce track fires and resulting delays
- Dampen noise from arriving trains
- Improve system safety by securing subway tunnels against unauthorized access
- Prevent riders from holding open subway doors, thereby enabling trains to enter and depart stations faster
- Allow the installation of heating, ventilation and air conditioning at stations

PSDs are more easily installed on newer metro lines, and many of the newest lines in the cities examined here have them. Older systems must surmount greater challenges, including stations that are curved, have limited platform space, or require significant reinforcing (rebuilding) of platforms to support the screen doors and rolling stock with varying door positions. Despite such issues and elevated costs, Paris was able to install PSDs on older platforms, and has seen considerable improvements in boarding and alighting at stations. This has allowed operators to more closely adhere to scheduled dwell times.³⁰

Seoul stands out for its record in having equipped almost all of its 300-plus stations with PSDs. Over two-thirds of these were retrofits. Seoul paid for this expensive effort by selling long-term leases for electronic advertising above the doors. Hong Kong's MTR has completed PSD installation at 30 underground stations, and Automatic Platform Gates at eight aboveground stations. Half the installation cost has been recovered through a 10 cents per journey surcharge.

All of Singapore's underground MRT stations were outfitted with PSDs when they were first constructed. Over the past few years, half-height PSDs were also installed at elevated stations. However, air circulation at these stations suffered because the doors blocked the natural cross ventilation, requiring the agency to install fans to improve customer comfort.

Wayfinding

Successfully executed wayfinding provides guidance and the means for people to navigate transit systems from their trip origin to their destination, as well as feel comfortable in their surroundings and effectively navigate space.³¹ In this sense, wayfinding can be thought of on two levels – systemwide, as in finding the way to your final transit stop, and on the station scale, as in finding your way to the platform or street level. Systemwide wayfinding has considerable overlaps with trip planning. In this context, it is worth noting the difference between geographic maps, which represent spatial relationships accurately, and topological maps, which are line diagrams of transit systems that have little relationship to actual distances.³² Topological maps are now used by most transit systems, as they allow greater legibility and conveyance of relevant information for transit customers.

For both systemwide wayfinding and more localized wayfinding, it is important to provide adequate amounts of information about connecting services, local attractions, etc. However, while agencies should include sufficient information to orient passengers, too much information leads to clutter that confuses customers; as new information is added, other information might need to be taken away to ensure clean visuals that passengers can easily comprehend. The aviation industry has made a special effort to guide passengers to their gates at airports; transit systems can improve customer satisfaction by providing similarly effective wayfinding for their customers.

Transit agencies use a variety of tactics and strategies to help customers find their way to the correct train, and then make their way afterward to the correct destination. Seoul has a simple but effective program of numbering its entrances and exits at each station; this numerical system is also used on the platforms where customers get on and off trains. For example, customers leaving a train can see signs indicating that Exits 1 to 4 are to be found using one staircase, and Exits 5 to 7 another staircase, and so on. Even larger stations with more than a dozen entrances are easily navigated by customers using the numbering system. This not only aids customers while they are in the station, it helps in communication and planning while outside the station; for instance, a customer can say, "Meet me at Exit 3," or direct someone to use Exit 3 and then walk one block to a destination. Hong Kong has a similar system, but uses letters instead.

New York often labels its exits with compass indicators, such as an exit that leads to the "southwest" corner of an intersection. This has some value, but can be confusing to those unfamiliar to the city or without a consistently excellent sense of direction. Nor does the system help customers on the platform make their way quickly to the right exit. New York is aided by a historical factor: Most of its underground lines, some more than a century old, were built via the "cut and cover" method – lines are close to the surface and riders often only have to descend one or two staircases to reach the train platforms. This makes the system easier to

30 For a more complete description of the function of PSDs in Communications-Based Train Control metro systems, see the Regional Plan Association report, "Moving Forward" (2014): <http://library.rpa.org/pdf/RPA-Moving-Forward.pdf>

31 For a more comprehensive overview of wayfinding design in general, see Donald Gibson's *The wayfinding handbook: information design for public places*, 2009, Princeton Architectural Press.

32 Henry Beck is credited with creating the first topological map of the London tube system in 1933.

navigate, with less time lost in getting to and from trains. Many modern “bored” systems³³ have deeper stations, and rely on long, motorized escalators that must be maintained, and add to egress time.

In Seoul, signage is written in multiple languages, including Korean, English, Chinese and sometimes Japanese. In Hong Kong, all signage is in Chinese and English, and in some stations a third language, Simplified Chinese, is also provided. While this multilingual signage can be very helpful to tourists, it also complicates signs and makes them more difficult to read at a glance.

Figure 16: Signage at a subway station in Seoul

Source:

Montreal is now testing new signage. At the end of the project, the Société de Transport de Montréal will have outlined precise signage guidelines throughout the network in order to guide customers during travel. This policy requires that signage conforms to universal accessibility principles and corporate brand image; adapts information according to various customer groups in the network; organizes and classifies information according to content (emergency, directional, service, etc.); shows the location of automatic fare vending machines, service points, elevators, etc.; and reviews messages and designations. This trial period will assess the legibility, contrasts, visibilities, positioning and sign dimensions around the whole Montreal metropolitan region.

In Vienna, designs of metro (U-Bahn), tram and bus stations have standard, distinctive formats. U-Bahn stations are marked with a “U” sign, which glows at night. Only 27 stations out of 101 need to have ticket offices, because of the high percentage of season ticket holders, and the fact that tickets are available on trams.

Wi-Fi and Cellular Phone Reception

As internet access becomes more essential in customers’ lives, a central challenge transit agencies face is whether and how to make this service accessible inside the subterranean areas of metro and commuter train service. A survey of the seven cities of this study shows that all of them are making efforts, but that the extent of the coverage varies tremendously.

A customer inside Seoul’s metro system can use his or her cellphone or smartphone in the stations, on the platforms and inside the trains. For better or worse, messages and calls continue unabated during transit trips. In Hong Kong, all MTR stations and trains were upgraded to 4G cellular service (with speeds faster than Wi-Fi) in 2013. Fourteen stations have “iCentres” that provide passengers with convenient, free access to the internet at computer terminals, or customers can take advantage of free Wi-Fi using their own laptops or mobile devices. Designated Wi-Fi services are available on board all Airport Express and Kowloon Through Trains, and on the concourses and platforms of 49 MTR stations. In Vienna, cell phone service is available throughout the

entire metro network, including tunnel sections and underground stations. The municipal government plans to implement Wi-Fi at major transit hubs.

By comparison, New York is just beginning to offer Wi-Fi and cellular services. Customers are accustomed to travel time being inside “a dead zone” where all electronic communication ceases. New York does have pilot programs in some stations, and has signed a contract to roll out service to 277 subterranean stations.³⁴ There are no current plans to offer service inside tunnels.

Table 2: Comparison of Select Customer Amenities at Transit Stations

City	Wi-Fi or Cell Service on Platform	Wi-Fi or Cell Service on Train	Platform Screen Doors
Hong Kong	Yes	Yes	Yes
Montreal	Select stations (Wi-Fi)	No	No
New York	Select stations (Wi-Fi)	No	No
Seoul	Yes	Yes	Yes
Singapore	Select stations (Wi-Fi)	No	Yes
Vienna	Yes	Yes	No
Washington, D.C.	Select stations	No	No

Public Art

Art in public transportation systems can serve multiple goals. First, a city may have a policy goal to promote the arts. Commissioning public art for transit systems can be an effective way to support cultural activity, with significant returns for the general public, as these works are often viewed by many thousands of people daily. Art can transform the overwhelmingly utilitarian transit infrastructure into a place of artistic expression, more interesting and diverse. All seven transit agencies surveyed in this paper have programs to foster public art, not only including visual arts, but poetry, music and dance performances as well.

In Montreal, the design for each station was assigned to a different and visually distinct architect. Thus, each station is unique, and almost all display the works of world-famous artists. During the construction of system extensions in the 1970s and 1980s, architects were asked to integrate artwork into station architecture. In some cases, the artwork even became functional. For instance, stainless steel tubular elements at Fabre station are not only decorative, but they also serve as hand rails and support the station benches.

New York’s MTA has a robust program called “Arts for Transit” that promotes permanent artworks in stations, as well as posters, music and poetry. Some of these initiatives have won prizes for excellence.³⁵

³³ Many modern systems are constructed using tunnel boring machines, and require 20 feet or more (typically equal to the diameter of the bored tunnel) of space between the roof of the tunnel and surface to ensure the integrity of the structure.

³⁴ <http://www.theverge.com/2012/11/19/3665984/transit-wireless-nyc-subway-t-mobile-att>

³⁵ The “Poetry in Motion” program was awarded the 2013 Grand Prize for Graphics by the American Public Transportation Association, and an LED exhibit at the Bleeker Street subway station was selected in 2013 as one of the best public art projects in the nation by Americans for the Arts.

On The Street: Bus and Tram Stops

Waiting for transit on the street, with its mix of pedestrian, bike and vehicular traffic, is a very different experience than waiting in a metro system, where conditions tend to be much more uniform. Designers of surface transportation stops face different challenges than those designing for the metro.³⁶

For buses and trams, the styles of stops vary tremendously, even within the same city. For example, in New York, a bus stop can be simply a sign on a pole, or a relatively large glass shelter with a roof and bench. Maps are usually located on a pole outside the shelter; in inclement weather a customer must walk out into the rain to see where the bus goes, or when it is going to arrive. Only a few shelters in New York have pilot displays with real-time bus information, although Bus Time is available for mobile devices.

Singapore's LTA has been making bus shelters more comfortable and convenient. The LTA has introduced weather screens, lighting and seats with armrests. Information panels with increased font size meet the needs of the aging population. The agency has also extended shelters at the entrances of MRT stations to provide shelter from inclement weather conditions during boarding/alighting of buses. Bus stations in Singapore are progressively being upgraded into air-conditioned transport hubs, and are integrated with adjoining metro stations and commercial developments. Commuters can wait for buses and transfer to trains in air-conditioned comfort, or they can do some shopping in the hub before transferring to their buses or trains.

Vienna's tram and bus stations have separate designs; "Strassenbahn" (tram) or "Autobus" (bus) is on the sign beside the station name. At tram stations, information regarding connections between metro and rail and disability access is available. Five hundred real-time arrival time displays were installed in 2010, and this will rise to 1,000 by 2015.

The Seoul Metropolitan Government is improving both bus shelter facilities and locations, and bus interiors. The SMG upgraded all shelters, and is planning to install 2,784 Bus Information Terminals, as well as 400 touch-screen BITs. The former uses voice recognition, and features electronic maps, road-finding, tourist information and bus arrival information. In addition, bus stops are being made more convenient for all customers, including those with disabilities, with heated seats, braille blocks, and information in four languages. The SMG is also improving transfers by relocating bus stops to more convenient locations or closer to metro stations, and removing unnecessary obstacles at bus stops. Some systems have gone beyond offering arrival displays only at surface transport stations, and now include these in nearby businesses. For example, at a major tram node in the center of Dublin, some adjacent businesses have public display signs on their interior walls. This way, customers can do some shopping or have a meal while they wait for their tram to arrive. A similar system has been instituted with success in Chicago.

Figure 14: Information display in store adjacent to tram station, Dublin.

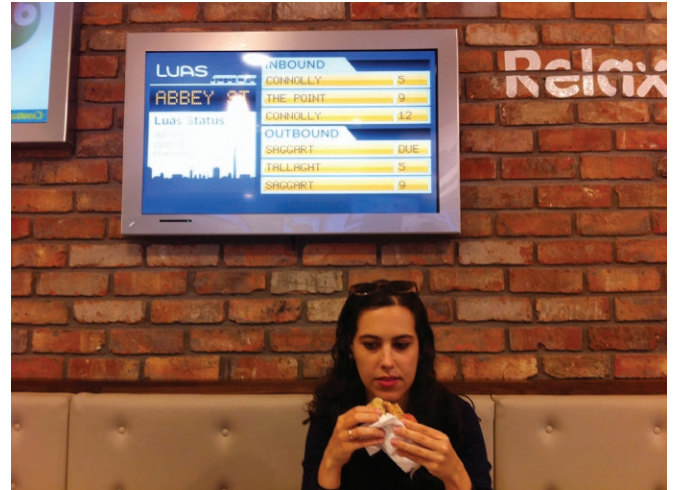


Photo: Jonas Hagen

For a survey of state-of-the-art practices in integrating surface transit with other travel modes (including newer alternatives such as bike and car sharing) and public space, please see "Door to Door: Combined Mobility and the Changing Transit Landscape."³⁷

In the Vehicles: The Customer Experience on Trains, Buses and Trams

The quality of transit vehicles, including exterior appearance, cleanliness, interior layout, seating, displays and audio, can have an important effect on the quality of a customer's experience. In general, most of the surveyed systems have fairly updated equipment and all are in the process of modernizing their fleets.

The Ultra-Low-Floor tram in Vienna stands out as a unique vehicle among the surveyed cities. Operating only in Vienna and Oradea, Romania, ULFs have the lowest floor height of any such vehicle,³⁸ putting the tram floor at the same level as the sidewalk. This greatly facilitates boarding for children (strollers), the elderly, those with luggage, wheelchairs and people with disabilities. Three hundred trams out of 450 are ULF, and the remaining 150 will be replaced by 2024. All 480 buses are low-floor. Metro, tram and bus vehicles have well positioned seats for passenger convenience, and display standardized route maps. Magazines are available for passengers to read during their trip. In 2006, Wiener Linien began a process to replace the existing metro fleet with modern vehicles, scheduled to conclude in 2016.

Hong Kong's MTR cleans the compartments of their trains daily before service begins and washes the exterior of trains every two days. The MTR maintains the temperature of the train

³⁶ Versus other surface transit modes, conditions for stations on Bus Rapid Transit systems are more similar to those of metros.

³⁷ <http://library.rpa.org/pdf/TLS-2014-Research-Paper-First-Last-Leg.pdf>

³⁸ <http://www.mobility.siemens.com/mobility/global/en/urban-mobility/rail-solutions/trams-and-light-rail/ulf/Pages/ulf.aspx>

compartment at or below 26 degrees Celsius throughout the year.³⁹ MTR purchased six new double-decker buses to enhance feeder service for the West Rail Line and Light Rail, strengthening the existing 121-bus fleet. Double-decker trams have been operating in Hong Kong for over a century. Colorfully painted with advertising, these iconic trams constitute an important link to the city's past and are a tourist attraction, in addition to providing vital services for transit customers.

Figure 15: Double-decker tram, Hong Kong.



Photo: Pondspider/Flickr

The Montreal metro was the first entirely rubber-tired metro in the world, which made it easier to go up slopes, allowed for faster acceleration and deceleration, and reduced the noise and vibrations transmitted to buildings around the stations. Each metro train consists of three, six or nine cars. A nine-car train corresponds to the length of a station platform, 152 meters (498 feet), and can transport up to 1,200 passengers, including 360 seated. There are two types of cars: the MR63, in service since the opening of the metro, and the MR73, acquired for the metro extensions during the 1970s and 1980s. Recent renewals include city buses (hybrid motorization, low-floor), commuter railway cars (bi-level) and metro cars.

Figure 16: Bi-level train in Montreal



Source: AMT - Agence métropolitaine de transport

Only a decade ago, New York still employed a substantial number of subway trains that were beyond their useful life. At the turn of the millennium, the MTA began an aggressive program to modernize its fleet, and retired its oldest trains. These were replaced by cars made by various manufacturers, featuring plastic seats, chrome handles and the brightest illumination of any subway cars. As for buses, the newest three-door articulated vehicles have clean diesel engines, and can accommodate more than 110 people. These buses are part of the recently implemented Select Bus Service, where off-board fare collection, dedicated bus lanes, and bus lane enforcement cameras have reduced some route travel times by nearly 20 percent. Low-floor buses are increasingly common in New York, and the current capital program includes the purchase of almost 2,500 new buses, plus investments in onboard security cameras.















By 2020, the Singapore LTA aims to have a full fleet of wheelchair accessible, low-floored and step-free buses. New trains will have fewer seats to create more standing spaces and mitigate crowding in trains during peak periods. In addition, new train designs remove the vertical poles near train doors, thus creating more space and preventing overcrowding near train doors. Handrails in the trains are being shifted away from train doors for the same purpose. The temperature of trains and buses of SMRT is set between 24 and 22 degrees Celsius, and some buses are fitted with intelligent climate control.

Many of the metro trains in Washington, D.C. date back to the system's founding in the 1970s and 1980s, and the WMATA currently has plans to replace much of its fleet. Most trains now are equipped with priority seating for people with disabilities and senior citizens, as well as emergency intercoms accessible to wheelchair users.

Seoul City is making efforts to improve lighting, air quality and noise inside buses, so that not only the general public, but also the elderly, children and pregnant women can comfortably use the bus lines.

³⁹ Research on thermal comfort shows that people generally feel comfortable within the range of 20 to 26 degrees Celsius. For a good review of the topic as it pertains to underground subway systems, see: Ampofo, F., Maidment, G., & Missenden, J. (2004). Underground railway environment in the UK Part 1: Review of thermal comfort. Applied Thermal Engineering, 24(5), 611-631.

Table 3: Accessibility of Transit Systems

Hong Kong	Montreal	New York	Seoul	Singapore	Vienna	Washington, D.C.
 98%+ metro stations are wheelchair accessible	 10% metro stations have elevators	 22% subway stations are ADA-accessible	 Most metro stations have an elevator and/or wheelchair lift	 100% metro stations have at least one barrier-free entry (80% have 2+)	 100% metro stations are wheelchair accessible	 100% metro stations are wheelchair accessible
 80%+ low-floor, wheelchair accessible bus fleet	 100% wheelchair accessible bus fleet (except minibuses)	 100% wheelchair accessible bus fleet	 Some low-floor, wheelchair accessible bus fleet	 50%+ wheelchair accessible (goal of 100% by 2020)	 Most low-floor, wheelchair accessible bus fleet	 100% wheelchair accessible bus fleet
MTR has incorporated aids for visually-, hearing-, and physically-disabled passengers including tactile station maps, induction loops, and wide gates.	STM lets passengers with disabilities apply for a Companion Card so their companion rides free. STM also provides the STM Companion service which can be requested at a station and an STM employee will bring you from one station to another.	MTA offers Transit Training, a program to help passengers with disabilities learn how to navigate the system. MTA also offers a paratransit service, Access-A-Ride which is either shared-ride, door-to-door, or feeder service.	SMRT uses braille tiles to help navigate visually-impaired passengers within a station.	LTA uses many aides to help disabled passengers including tactile ground surface indicators to guide within a station and light cues on platform.	Wiener Linien introduced the POPTIS program with its focus on improving accessibility for all through including standardized pictograms, height-adapted ticket buying stations, and tactile strips to navigate passengers.	WMATA offers a Travel Training program for passengers with disability to get accustomed to navigating the system. WMATA also offers MetroAccess, a paratransit alternative.

Accessibility of Transit, People with Disabilities and Other Customers

The cross-cutting issue of accessibility relates to all of the previously discussed elements of the customer experience – communication, station design, vehicle characteristics, etc. In most cities, legislation requires transit facilities to address the mobility needs of people with disabilities, including passengers with visual, hearing, and mobility impairments. Many transit agencies strive to provide even better and more convenient facilities than are required by law. This can have great benefits for customer satisfaction, as many other types of passengers benefit, including children, seniors, parents with strollers and people traveling with luggage.⁴⁰

Nonetheless, accessibility varies tremendously among the seven systems examined. The older systems, such as New York, have the greatest challenge in that their networks were built before accessibility features such as escalators and elevators were common; only 22 percent of all 486 subway stations are accessible to people with disabilities. Accessibility rates are much higher for other cities, and three even have 100 percent accessibility (see Table 3).

The systems that perform best with respect to accessibility continuously improve station premises to facilitate barrier-free use for customers with disabilities. Metro systems in Singapore, Vienna, Seoul, Hong Kong and Washington, D.C. have features such as handrails on ramps and stairs, ubiquitous wheelchair-accessible escalators and elevators, audible warning signals and large-print and tactile-braille signs for visually impaired passengers. Hong Kong has induction loops installed at all customer service centers, and active line diagrams⁴¹ for hearing-impaired passengers. Seoul has made a point of making it easy for people with disabilities to get assistance from transit personnel by locating staff offices by the main entrance of many metro stations. Some systems use customer forums and feedback to improve accessibility. For example, Singapore's MTR responded to feedback from the "Listening x Responding" program by accelerating the installation of external lifts, and Montreal's AMT initiated a transport advisory committee for people with disabilities in 2007. In 2008, Wiener Linien cooperated with organizations for people with disabilities to develop Pre- On- and Post-Trip Information System, a navigation system that enables people with a severe visual impairment to navigate their way independently around Vienna's underground network. POPTIS, which was nominated for the 2009 national transport prize, is based on a clearly-arranged system architecture that facilitates boarding, disembarking and changing trains, as well as accessing aboveground transport services.

⁴⁰ Travel for business and pleasure has grown dramatically and consistently in recent decades. For example, international tourist arrivals have shown virtually uninterrupted growth – growing over 43 times from 1950 (25 million) to 2013 (1,087 million), according to the U.N. World Tourism Organization.

⁴¹ A dynamic display that lights up to indicate travel progress, as on a subway line.

Figure 17: Paratransit in New York



Source: Metropolitan Transportation Authority / Patrick Cashin.

A few agencies stand out regarding the care they have taken to make it easy for customers with disabilities to use surface transportation. For people with disabilities, Singapore's LTA has removed barriers at bus stops so that buses can easily deploy wheelchair access ramps for boarding and alighting. The LTA also ensures that all furniture sited within the shelter allows sufficient space for users to maneuver wheelchairs with ease while accessing information in the bus shelter. The entire bus fleet (more than 6,000 buses) of New York's MTA is accessible, as is Washington, D.C.'s. In Singapore, the SMRT has 245 wheelchair accessible buses with plans to increase this number. The WABs are distinguished by a blue icon of a passenger-in-wheelchair displayed at the front of the bus. Each WAB service can accommodate up to two passengers in wheelchairs.

Because Federal law in the U.S. mandates that any agency providing fixed-route bus or subway service also provide paratransit service for individuals unable to use the regular transit system, the MTA also operates Access-A-Ride service. Access-A-Ride has a fleet of 1,970 paratransit vehicles, 1,300 of which are vans with wheelchair accessibility. The program provides three types of service – shared-ride, door-to-door, and feeder service – 24 hours a day, seven days a week. However, customers have a maximum number of rides based on trip distance. The fares are the same as full fare on public transit. In Washington, D.C., Metro Access is a similar program.

Some agencies offer special services to non-disabled customers as well. In Montreal, Between Stops is available to women who travel alone at night. Also in Montreal, TaxiBus is a public transit alternative for districts where there is no regular bus service. The shared TaxiBus service is available from Monday to Friday, except on legal holidays. It runs mostly between the major train stations on a regular route, and customers must reserve a seat at least 40 minutes in advance. Similarly, Vienna offers 17 night route buses and 14 on-demand buses on weekdays and weekends. The metro runs every 15 minutes Friday and Saturday from midnight until morning. These night services transport about 45,000 passengers a month. New York's MTA allows customers to exit the bus between stops during the overnight hours, if the driver determines it is safe to do so.

Conclusions, Challenges and Lessons Learned

While it's safe to say that all the agencies examined in this study are striving to improve the customer experience, it's also clear that that experience varies tremendously from system to system. In some cities, customers travel on metros where stations and platforms are quiet and well lit, where platform screen doors are ubiquitous, as is access for special needs users. In other systems, train stations are dark, noisy and difficult to navigate, and complete accessibility for customers with disabilities is rare. The availability of information for trains, trams, buses and other modes also varies greatly.

There are several interventions that are critical to improving the overall customer experience. These include:

Open and Proactive Communication

Recent developments in communication can facilitate an entrepreneurial, proactive posture for transit agencies. For example, providing data in an open way can unleash the creativity of third parties, who typically develop more creative mobile apps due to their ability to leverage other data and think beyond the scope of just transit operations – such as a trip-planning app that shows your caloric consumption for each of your travel options. Also, social media such as Twitter can allow interactive, personal feedback that also provides information to a broader audience. Sharing information and a more proactive approach can help leverage communication activities and foster creativity, leading to richer experiences for transit customers.

Design and Amenities at Transit Stations Matter

Elements like station design, wayfinding and public displays should be taken very seriously, focusing on the details of the experience. Care should be taken to create a comfortable metro station that is easy to navigate, an ease that must also continue throughout the system, especially at intermodal hubs. Station overhauls, or thoughtful designs for new stations, can help make systems more attractive by creating open areas that attract users and provide plenty of space for circulation, as opposed to claustrophobic places that result in congestion and repel customers. Other amenities, such as shopping, restaurants, Wi-Fi, public art and platform screen doors, can also help create a more pleasant and environment for customers.

Raising the Bar on Surface Transportation

Transit agencies should be as detail oriented when it comes to the customer experience on buses and trams as they are with metros. The best transit systems use low-floor vehicles, provide

ample information on services via various means, and make sure stops are comfortable and easy to use for all customers. Agencies can encourage the use of surface transit by providing amenities to protect customers from bad weather and strong sun, such as covered walkways and ample (sometimes heated or cooled) shelters at stops.

A Transit System That's Accessible to All Customers

This is a cross-cutting issue that affects not only people with disabilities, but a much larger population that includes travelers with luggage, the elderly and children. Making transit more accessible increases its attractiveness for all customers, even the most able-bodied ones. Given recent demographic trends, such as growth in elderly populations and international travel, transit agencies *must* create truly accessible systems to effectively serve this population.

The recommended actions range from capital-intensive station retrofits and vehicle procurements to relatively inexpensive investments in website design and new signage. Some, like wayfinding, platform screen doors and station design can have a real impact on system capacity and service reliability. All of these improvements take transit beyond its utilitarian trappings, making it more attractive to its large middle and upper middle class clientele – an important constituency that serves as the backbone of political support for transit. This support is critical to securing funds for existing services and expansion of public transit, urgently needed in many places. As transit turns the corner from one century to another, making transit customers' experience easy, comfortable and even uplifting are goals that all systems should strive to achieve.

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