

BREAKING BARRIERS

Exploring the Integration of On-Demand
Paratransit for Metro Vancouver



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EXECUTIVE SUMMARY

INTRODUCTION

It is essential for transit agencies to strive for a more equal transportation experience for conventional and paratransit customers alike. To do so, agencies must seek ways to improve paratransit to ensure that all customers can participate in the social, economic, and physical life of our communities.

TransLink and Coast Mountain Bus Company (CMBC) operate the HandyDART regional paratransit service for Metro Vancouver. The service needs improvement to keep pace with growing ridership demands and demographic changes. Additionally, TransLink wishes to advance a Family of Services approach to provide paratransit users seamless access to all the agency's services and overcome the barriers paratransit users currently experience (TransLink, 2017). TransLink and CMBC partnered with a team of graduate students from Ryerson University's School of Urban and Regional Planning to seek methods of modernizing and removing user barriers of the HandyDART system through on-demand transit integration.

This report finds that on-demand paratransit presents a promising opportunity for TransLink's HandyDART system and provides recommendations for further consideration by TransLink and CMBC. To inform these recommendations, the research team established a literature review-informed set of evaluation criteria, examined case studies of existing on-demand paratransit services, developed a series of best practices, and completed a gap analysis. The team consulted mentors in government relations, executive management, technology solutions, and transportation planning to provide industry insight.



FINDINGS

Literature Review

The quality and utility of accessible transportation services are only as good as customers perceive them to be. In order to effectively plan for accessible transportation, agencies must consider the perspective of all users to maximize the benefits of service delivery (Bjerkan & Øvstedal et al., 2020). Diminishing one component triggers impacts to others and ultimately harms the overall user experience.

The literature reveals that while born out of the Human Rights imperative of equal access to services, traditional paratransit services are struggling to effectively serve the diverse needs of customers (Field et al., 2007). For example, inflexible service delivery models, and a lack of accessible information have diminished the potential benefits of paratransit services (National Council on Disability, 2015). Given the potential of paratransit service to mitigate other societal costs in healthcare, education, and income supports, the provision of good paratransit services is not only a matter of promoting equity, but also can result in financially prudent outcomes (Canadian Urban Transit Association, 2013).

The literature reveals that while born out of the Human Rights imperative of equal access to services, traditional paratransit services are struggling to effectively serve the diverse needs of customers (Field et al., 2007).

There is encouragement in the potential for contemporary on-demand transportation technologies to improve paratransit services. Today's on-demand systems are characterized by their immediacy in responding to customers' needs and their use of software to optimize vehicle matching and routing (Lucken et al., 2019; Daganzo & Ouyang, 2019). Through a spectrum of public-private partnership and operating models, on-demand transit solutions can enable agencies to address service gaps, improve customer independence, and meet flexible trip needs. On-demand services can scale rapidly to meet changes in demand, while presenting possible cost-efficiencies for agencies (Comfort, 2020; Simiakis, 2020). Despite the promise of these solutions, on-demand partnerships must be critically evaluated to ensure that new services are delivered equitably and that agencies retain sufficient control of data and oversight of contractors (Pangbourne et al., 2020; Curtis et al., 2019).

Evaluation Criteria

A set of evaluation criteria was developed to assess the potential utility and quality of delivering an on-demand paratransit solution for Metro Vancouver. Informed by a literature review of industry and academic sources, the criteria are categorized under five themes: User Experience, Customer Satisfaction, Service Performance, Ridership Scalability, and Financial Impacts. Each theme has metrics that were used to assess the experiences of both paratransit customers and the agency when implementing an on-demand paratransit solution.



User Experience



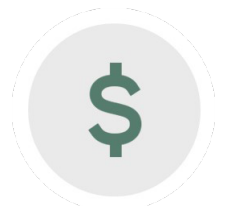
Customer Satisfaction



Service Performance



Ridership Scalability



Financial Impacts

Case Studies

To present information and solutions relevant to TransLink and CMBC, the research team examined eight North American transit agencies with existing on-demand paratransit services or similar on-demand services which also serve paratransit customers. The eight case studies each represent a diverse geography, reflecting the geographic challenges that face HandyDART within Metro Vancouver. They include large metropolitan regions such as Dallas, Texas as well as smaller communities such as Guelph, Ontario. The selected cases include varying degrees of private partnership in their on-demand paratransit service delivery.

It is important to recognize that for TransLink to launch an effective on-demand paratransit system, some degree of public-private partnership is necessary (Lucken et al., 2019). This can range from having a private firm develop a mobile application to having a private contractor provide a supplementary transit fleet as well as operations and administrative services.



Best Practices

Using our evaluation criteria, each case study was assessed and compared with our literature-derived benchmarks to determine current best practices. Discussions with industry leaders provided areas for refinement to validate the final best practices identified. Our analysis showed that, for most benchmarks, case study agencies met or exceeded the metrics for what makes a good accessible system from a user's perspective. Although each agency's model was not without its drawbacks, the cases collectively provided options for improvements in one evaluation metric or another.

Successful industry best practices included the use of multiple booking mediums, multi-fleet trip coordination, conditional service eligibility policies, and readily available accessible information. For some criteria metrics, such as trip denial rates, insufficient data was available among the case studies. In this case, the literature benchmarks remained the best practices that services should aspire to.

Successful industry best practices included the use of multiple booking mediums, multi-fleet trip coordination, conditional service eligibility policies, and readily available accessible information.

Gap Analysis

To determine how CMBC can improve its HandyDART services, their existing service model was assessed through the evaluation criteria metrics and compared to the best practices. HandyDART's model shows success with low-trip denial rates and plans to expand payment options. Our team determined that the existing service delivery model has shortcomings that must be improved upon in order to successfully provide on-demand paratransit services through an enhanced Family of Services approach. The identification of the following four key shortcomings informed the four policy recommendations:

1. Absence of same-day instantaneous ride booking to flexibly meet customer needs
2. An open eligibility process that does not customize options for applicants
3. Inconsistent customer experiences between HandyDART and supplementary taxi services
4. Coordination of specialized vehicle fleet across the wider network to realize benefits of an on-demand mode

CONCLUSIONS AND POLICY RECOMMENDATIONS

This research has confirmed that introducing on-demand paratransit services in addition to the existing HandyDART services can be beneficial. Implementation is possible through multiple methods to best suit local needs and this report provides **three enhancement models** – Improvement, Innovation, and Transformation – that are meant to guide TransLink and CMBC’s potential introduction of on-demand paratransit service. The **Improvement** model presents minor changes and minimal contracting and decentralization, while the **Innovation** and **Transformation** models consider expanded private partnerships and further decentralization of service delivery. Each model provides benefits to the customer and agency alike, however TransLink/CMBC must first commit to substantive changes for successful implementation. The gap analysis identified four shortcomings which are addressed in the following policy recommendations.

This report recommends that TransLink/CMBC consider the following recommendations:

1. Engage with a technology provider on developing **instantaneous booking and dispatching software** to improve customer experience and vehicle routing.
2. Introduce **conditional user eligibility** for paratransit services and establish an **in-person assessment centre** to jointly identify and assist customers in determining their service needs.
3. Prioritize **enhancements to operator and user training** to ensure consistent service quality and customer confidence across paratransit and conventional transit services.
4. Optimize the use of specialized vehicles by **pursuing trip and fleet coordination** between conventional and paratransit services.

Taken together, these recommendations present an opportunity for TransLink and CMBC to improve paratransit for customers and advance its Family of Services approach. It is the hope of the research team that this report provides useful and actionable recommendations to TransLink and CMBC as they continue to improve their services for the region.





Section A:

Literature Review

PARATRANSIT

ORIGINS

The imperative to provide paratransit services in Canada is born out of the *Charter of Rights and Freedoms, Section 15*, which prohibits the discrimination of people “from laws or programs based on physical or cognitive disabilities.” These protections are further upheld in Provincial Human Rights Codes, including the British Columbia Human Rights Code, Section 8, which protects from discrimination in receiving “any accommodation, service or facility customarily available to the public.” Paratransit services were created to ensure public transit services are similarly provided to people living with disabilities, who are unable to use conventional networks. TransLink’s HandyDART service was established in 1981 and seeks to serve customers with disability across the Metro Vancouver region (BCTransit, n.d.).

Beyond its legislative imperative, paratransit is globally understood as an important service that facilitates social and economic inclusion by ensuring everyone can access employment, recreation, and other services, and travel to meet their daily needs (Canadian Urban Transit Association [CUTA], 2013; Grise et al, 2017, Worldbank, 2020). By achieving these goals, paratransit services also reduce government budget pressures on programs like healthcare and income supports (CUTA, 2013).

TRADITIONAL PARATRANSIT

Accessible public transit is traditionally delivered in the following three ways. First, using accessible vehicles in a conventional fixed-route network; second, dispatching public agency-owned specialized vehicles in parallel to the conventional network; and finally, by contracting third party operators and accessible vehicle fleets (Field et al., 2007). While these are not mutually exclusive, for the purposes of this literature review and project, paratransit will focus on the second and third service delivery models. HandyDART operates a mostly contracted service with drivers, day-to-day customer service and bookings managed by a contractor. HandyDART’s fleet however operates in a mixed format, using both agency-owned vehicles and contracted taxi trips (TransLink, 2017).





WHAT MAKES PARATRANSIT SERVICES SUCCESSFUL?

Stahl's (1997) "user perspective of accessible transport" provides a visually compelling starting framework to understand what successful paratransit service looks like. To understand if a trip is accessible, any analysis must evaluate it from the user's perspective. Each component, from planning to make a trip, to arriving at your destination, can present a barrier or facilitator to providing accessible transport (Risser et al., 2015). Before considering making a trip, customers must first be deemed eligible by the transit agency for paratransit service. Successful paratransit service should ensure that eligibility criteria are not burdensome on the customer and effectively match customer needs to the available programs (National Council on Disability, 2015). Stahl's (1997) visual representation, shown in Figure 1 below demonstrates how each element of a trip interacts with the next.

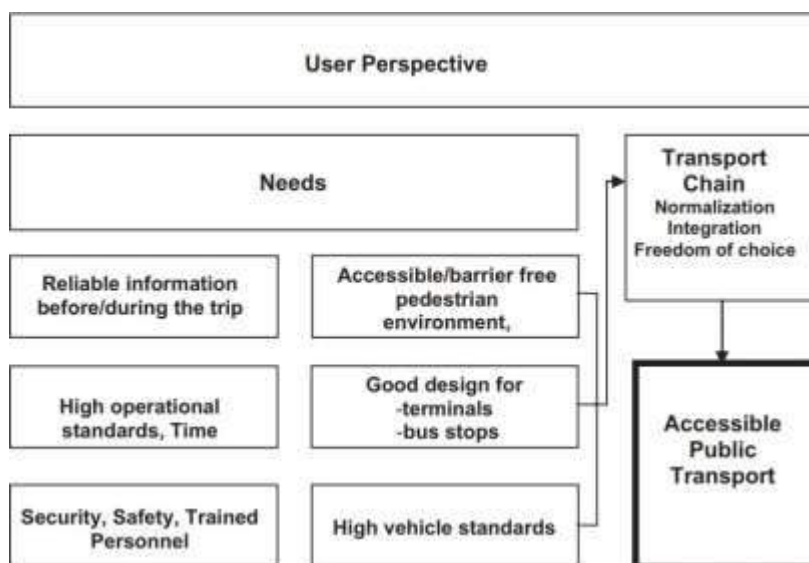


Figure 1: Stahl's (1997) visualization of the "User Perspective" in making a trip shows how each component influences the next to inform the overall user experience.

Bjerkan & Øvstedal et al.'s (2020) meta-study on paratransit literature provides further insights and refinements on how the elements of a trip can either impede or facilitate a user's mobility. Bjerkan & Øvstedal et al. (2020) break down these elements and their required function into the following:

Accessible, Centralized Information

- A centralized portal must provide, in an accessible format, information on service areas, registration, eligibility, assistance programs, travel times, and financial support.

Flexibility

- Maximum flexibility in booking, cancelling, and routing services ensures real-time trip needs are met in a convenient fashion, building user confidence in service.

Safety and Security

- Driver training, vehicle design, established conduct standards for customers, and safe transfer hubs reduce stigma and anxiety for users, allowing them to feel comfortable in their travel.

Physically Accessible Design (also known as Universal Design)

- Accessible design of transfer points and the surrounding built environment, along with sufficient parking at fixed-route stations builds user confidence and respects the automobility needs of users.

Reliability

- Service experience, administrative procedures, travel times, and pick-up windows should be consistent, with any service changes promptly communicated to users.

Economic Predictability

- Trip cost, transit service areas, and the availability of support programs should have long-term predictability to allow users to properly assess and plan their transportation and financial needs.

Reduced Administration

- The registration process should be transparent with questions answered promptly.
- Trip booking must be simple and offered through multiple mediums.

Short Predictable Travel Times

- Trips must be as direct as possible, reducing potential delays which restrict user mobility.

EMERGING CHALLENGES OF TRADITIONAL PARATRANSIT

Despite paratransit's intentions to meet Stahl (1997) and Bjerkan & Øvstedal's (2020) success criteria, services must overcome emerging constraints.

A key challenge for transit agencies is the cost to deliver trips (CUTA, 2013). For Translink, operating a paratransit trip costs \$39.26 per ride whereas operation of a conventional transit trip costs \$2.36 per ride. Demand for paratransit services in Metro Vancouver are expected to continue to grow as a result of a rapidly aging population, leading to a significant financial risk for the agency to not be able to provide an adequate level of service due to the absence of additional funding (CUTA, 2013).

In the absence of additional funding, paratransit services have imposed strict registration and eligibility criteria, which disincentivizes use from eligible individuals and places additional burdens on riders (Field et al., 2007; Nation Council on Disability, 2015). Customer with different disabilities report different barriers in meeting eligibility criteria to access paratransit, despite their legitimate need for specialized services (Beyzak et al., 2017). Services often lack clear, centralized, and accessible information or training for users which limits riders' independence and confidence in the service (Bjerkan & Øvstedal, 2020; Nation Council on Disability, 2015).

For riders who use these services, cumbersome and strict booking protocols provide little flexibility to adapt to the real-time needs of riders. For those who use paratransit to access jobs, unpredictable wait and travel times can result in employment instability, missed appointments, and an overall sense of anxiety. The result is that paratransit services are unable to fulfill their legislative imperatives and are unable to deliver the fulsome benefits of economic and social inclusion.

Demand for paratransit services in Metro Vancouver are expected to continue to grow as a result of a rapidly aging population, leading to a significant financial risk for the agency to not be able to provide an adequate level of service due to the absence of additional funding (CUTA, 2013).

ON-DEMAND

ORIGINS

On-demand transit's roots are based in early dial-a-ride paratransit services that were popularized throughout the 1980s (Lucken et al., 2019). These systems offered users the ability to arrange pick-up and drop-off locations directly with transit agencies. These "custom transit" services grew quickly in popularity and have since grown into what we now understand as traditional paratransit. Paratransit filled in a gap that existed in many underserved low-density areas of cities, connecting users to frequent transit routes (Lucken et al., 2019). The concept of custom transit has since advanced through technological innovation, primarily driven by the private sector. Today, users can book rides digitally through mobile and web-based applications (Apps). For example, Uber and Lyft have dominated the personalized private transportation industry with physical assets (vehicles), labour (drivers), and back-end applications (software), while companies such as Spare Labs, VIA and RideCO have paved the way for on-demand service integration with existing transit services (Lucken et al., 2019).

CONTEMPORARY ON-DEMAND TRANSIT

Over the last decade, on-demand transit services have become a global phenomenon. In its most basic form, on-demand transit provides users with a personalized transportation experience directly from their pick-up location to their requested destination. Innovations in technology have enabled further integration of on-demand service models with existing conventional networks (Daganzo and Ouyang, 2019; Lucken et al., 2019). For example, fixed-route public transportation can be complemented with on-demand service to close the first-mile/last-mile (FMLM) gap. The integration of these two models can increase on-time performance and reliability of paratransit services and improve access for low-income and other underserved transit users (Weinreich et al. 2020; Lucken et al., 2019; Yan et al, 2019). By personalizing trips and offering door-to-door services, on demand transit can reduce single-occupancy vehicle use and create a more personalized, efficient and equitable transportation system.



(TransLoc, 2020)

Figure 2 is a model created by Lucken et al., (2019) that explains the distinction between mobility on-demand (MOD) service models where the assets are provided by the public sector versus by the private sector. Lucken et al. (2019) indicate that most on-demand services involve a public-private partnership, with a reliance on private-sector assets such as software, vehicles, and operator.

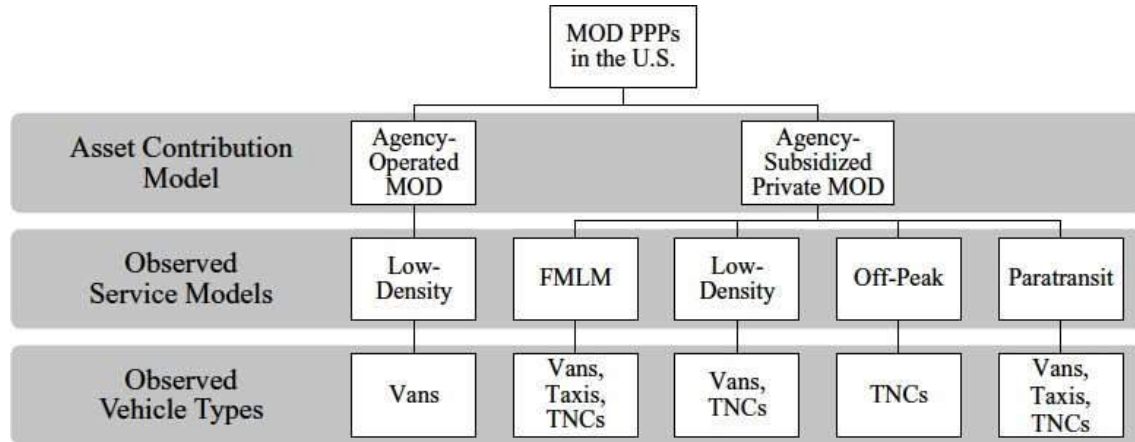


Figure 2: This chart illustrates two primary types of public-private partnerships (PPPs) in which mobility on-demand (MOD) services operate. The first involves the public transit agency providing the assets (vehicles). The other involves one or more private companies providing the assets, which may include vans, taxis, or transportation network company (TNC) vehicles. Outsourcing work to other companies can help improve first mile/last mile (FMLM) connections and off-peak transit service in low-density areas.

Integrating on-demand services allows for responsive adjustments. For example, the technologies used for on-demand transit allow for service to adjust to changes in supply and demand in real-time (Comfort, 2020). On-demand service platforms and their corresponding technologies (software) provide the capacity for service to expand across regions and to meet the needs of underserved populations (The Fourth Regional Plan, n.d.). The integration of on-demand transit with conventional transit systems improves connectivity by providing riders an option to meet first-mile/last-mile connection challenges resulting from fixed-route transit’s restrictive service areas (Weinreich et al., 2020). On-demand transit services enable agencies to provide a range of services adapted to specific user needs, such as reducing average waiting times and providing door-to-door service (Daganzo and Ouyang, 2019). On-demand transit allows prospective riders to select and manage trips on their own, building user autonomy and contributing to increased quality of life, especially for elderly riders and persons living with a disability (Comfort, 2020; Via, 2020).

The integration of on-demand transit with conventional transit systems improves connectivity by providing riders an option to meet first-mile/last-mile connection challenges... (Weinreich et al., 2020).

CHALLENGES OF ON-DEMAND

Although on-demand transit has its benefits, private sector influence on the physical and digital realm of service has increased concerns around user equity and data privacy and sharing. For example, Pangbourne et al., (2020) highlights the disadvantages for low-income users that derive from the use of TNC services. Despite being promoted as a cost-effective option for transit agencies, on-demand TNC's prioritize profit over user equity. With public agencies increasing their reliance of on-demand services, TNC's gain leverage to dictate usage fees, on their terms. If a transit agency does not subsidize these increased usage fees, the fees can be downloaded onto riders, creating barriers for low-income transit users (Fei and Chen, 2015; Pangbourne et al., 2020). Additionally, without strict contract criteria, private service providers may provide vehicles that do not meet the accessibility needs of all users, an issue that can be common with the agency-subsidized private MOD model (Lucken et al., 2020).

In addition to ensuring accessible contracted vehicles, operator training is essential to meet customer's accessibility needs. In the United States a national standard for training is part of the Americans with Disabilities Act, however these standards are a baseline and agencies can choose to include their own additional training regimes if needed. In British Columbia, there is no standardized accessibility training mandated by the Provincial Government, meaning TransLink currently uses its own program (Province of British Columbia, 2019).

Data is a crucial aspect for both public transit agencies and on-demand service providers. However, unless an explicit open data policy is agreed upon between public and private agencies, trip data can be retained entirely by the private service provider (Lucken et. al, 2020; Curtis et al., 2019). This enables private companies to use ridership data at their own discretion, making service adjustments and analysis difficult for public agencies (Lucken et. al, 2020; Curtis et al., 2019).



(CoMotion News, 2020)



INTEGRATION

Integrating on-demand with paratransit services has the potential to address previously discussed challenges associated with traditional paratransit systems, delivering benefits to both riders and public transportation agencies (Comfort, 2020).

Riders benefit from the improved flexibility of service that allows them to book rides by web or mobile application as well as by telephone (Simaiakis, 2020; LaMondia et al., 2018) and from the freedom to travel without the constraint of having to predict trip needs far in advance (Comfort, 2020). On-demand transit also decreases user stress levels by providing flexible routing, including traditional door-to-door service (Comfort, 2020). Riders may experience improved positive perceptions of public transit (Comfort, 2020). In terms of agency benefits, on-demand transit can increase ridership, decrease trip denials for paratransit, and reduce operating costs (Comfort, 2020; Via, 2020). On-demand technologies can also improve efficiencies by reducing call centre volume, manual data entry, and scheduling, while providing accurate trip timelines and vehicle location tracking through real-time data technologies (Comfort, 2020; Simaiakis, 2020). Simaiakis (2020) highlights that the inclusion of maps that track vehicle locations are necessities as opposed to 'nice to haves' for a positive rider experience.

Although on-demand has the potential to improve paratransit travel experiences, the limitations to the service should also be acknowledged. One key challenge is that users, such as older adults, may not have the technological acuity, or an actual smartphone, to schedule a ride using smartphone-based apps (Golant, 2019), suggesting that the integration of these services may not always lead to more effective or accessible travel. Additional barriers posed by Curtis et al. (2019) relate to the partnership between transit agencies and TNCs and include accessing accessible vehicles that can accommodate larger mobility aids. Agencies need to account for the sharing of liability within the partnership due to the decentralized nature of the service model (Curtis et al., 2019; Feigon and Murphy, 2016). If TNCs were to directly

provide paratransit services, there are concerns around safety, proper training for drivers to safely transport riders, and accessible fleet to ensure there is not varying levels of accessibility that would bear a burden on individual drivers (Feigon and Murphy, 2016).

Overall, there is much encouragement in the literature for the integration of on-demand with paratransit as it has already shown success with conventional transit systems (Simaiakis, 2020; Weinreich et al., 2020; Via, 2020). Technology that provides real-time information has been successfully integrated with fixed route transit (LaMondia et al., 2018). Simaiakis (2020) highlights that microtransit and paratransit services “have the same [technological] DNA” (p. 40) and questions the hesitation and current gap in service integration.

*“The truth is that the technology behind **paratransit** and **microtransit** have the **same DNA**, with a core focus on efficiently pooling riders by using an algorithm that pairs individuals headed in the same direction.... However, paratransit riders have unique needs, and **technology** can and should be **adapted** accordingly.”*

(Simaiakis, 2020, p. 40)

UNIVERSAL DESIGN

In addition to enhancements directly targeting paratransit service delivery, such as the integration of on-demand service, best practices in transportation literature highlight the importance of universal design across transit systems. The American Public Transportation Association (APTA) advocates for accessible design in fixed-route transit stations, boarding platforms, and the areas surrounding the station including transfer points, entrances and exits. These changes can significantly increase the user experience for paratransit customers and other transit riders alike, serving a diversity of needs for people of all ages, genders, cultures, health situations, and abilities and thus benefitting society in the long-term (APTA, 2020). By adopting universal design guidelines across service types, TransLink will be more successful in achieving a “Family of Services” approach to transit delivery, which enables a smooth integration between conventional and custom transit services to meet customers’ needs and enhance operational efficiency.

SPECTRUM OF SERVICE DELIVERY

To understand how a particular paratransit solution works, it is important to consider how the various components which make up a service are delivered. From vehicle fleets, to operators, to registration administrators, to call centers and customer service agents, transit services can take on multiple delivery models. Models can be either fully public, in which the transit agency delivers all components of the service and funding, or entirely private in which a private Transportation Network Company (TNC) provides all the components, with the government only providing funding. There is also the potential for hybrid models due to the variability of who manages these components, giving rise to a “Spectrum of Service Delivery.” Figure 3 below provides an illustrative base on which the cases evaluated in the following sections of this report will be placed.

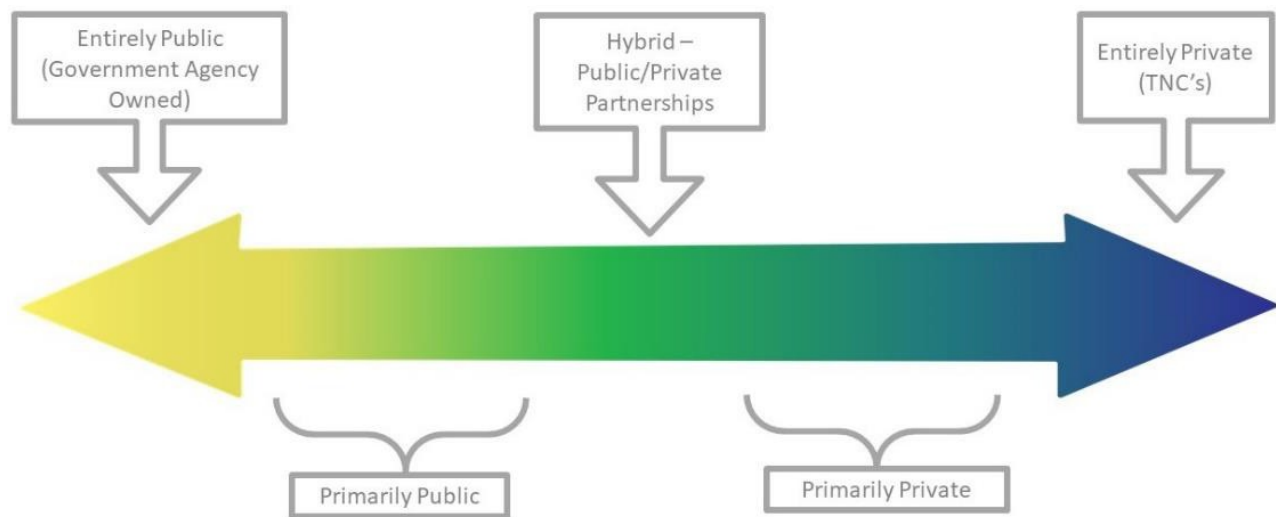


Figure 3: *Spectrum of Service Delivery Models*



Section B:

Evaluation Criteria

OVERVIEW

As indicated by the literature review, the benefits of accessible transportation services are entirely dependent on their utility to customers. As a result, Stahl's (1997) model of "user perspective for accessible public transport" provides the basis from which we developed the following evaluation criteria. The additional findings in our literature review were used to reinforce Stahl's (1997) model and build on each criterion described below.

Table 1. A summary of the evaluation criteria and associated metrics identified in research.

Criteria Theme	Criteria Metrics
User Experience	Registration Process Service Eligibility Ride Booking Requests Method of Fare Payment
Customer Satisfaction	Operator and User Training Trip Coordination Instantaneous Ride Booking Real-Time Information Accessible Vehicle Design
Service Performance	Reducing Trip Denial Rates Improving Punctuality
Ridership Scalability	Ability to Accommodate Ridership Changes Service Scalability
Financial Impacts	Trip Costs Fare Subsidies

USER EXPERIENCE

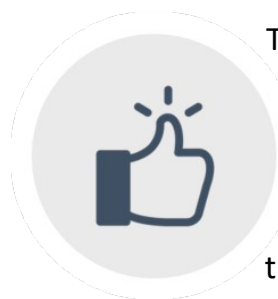


Registration processes, service eligibility, and ride booking requests form the most important interfaces between the service and customer (Bjerkan & Øvstedal, 2020). Registration processes should be simple, transparent, and done in coordination with applications for additional relevant support programs (National Council on Disability [NCD], 2015). The result of this approach is one that removes undue burden from the user of navigating

bureaucracies and facilitates a seamless process. **Service eligibility** should be as open as possible to ensure the Human Rights needs of potential users are met and digital technologies can automatically match users' needs to the appropriate service for which they qualify (Field et al, 2007; NCD, 2015). Customers must be able to carry out **ride booking**

requests through a variety of mediums. To ensure technological abilities or access do not restrict, booking must be available by phone (Simaiakis, 2020). For greater convenience, other options now available include booking by mobile app or web portal (Simaiakis, 2020). Accessible **methods of fare payment** should also include cash and tickets in order to properly meet the needs of unbanked customers who are not able to use debit or credit cards on the mobile applications (Bjerkan & Øvstedal, 2020). Not having these options could further existing inequities

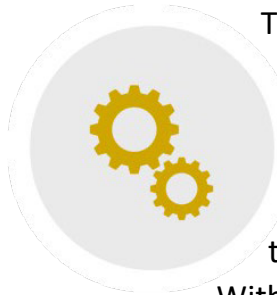
CUSTOMER SATISFACTION



The dominant metrics to assess customer satisfaction are operator and user training, trip coordination, instantaneous ride booking, real-time information, and appropriate vehicle design (Comfort, 2020; Simaiakis, 2020; Weinreich et al., 2020; Bjerkan & Øvstedal, 2020; Wasfi et al. 2019; LaMondia et al., 2018; Frost & Bertucci, 2010). The literature highlights that customers should feel safe, comfortable, and confident, and not inconvenienced, stressed, or constrained (Comfort, 2020; Simaiakis, 2020; Weinreich et al., 2020; Bjerkan & Øvstedal, 2020; Wasfi et al. 2019).

Standardized, consistent training for operators is crucial to ensure riders feel safe and comfortable during their travels (Bjerkan & Øvstedal, 2020; Wasfi et al. 2019). The availability of user training coupled with clear accessible information allows riders to navigate between conventional and paratransit services with ease and confidence (Bjerkan & Øvstedal, 2020; Wasfi et al. 2019). User training, also called travel training, provides the customer with one-to-one or group sessions and may include system orientation, familiarization with vehicles, and step by step live experience through an entire trip (Beyerle, 2017). Additionally, services should leverage application software that integrates fixed-route and paratransit trips, with this **trip coordination** to be done in one place to improve certainty and convenience for customers (Weinreich et al., 2020). The ability to **book rides in a moment's notice** provides users with greater flexibility so they are not constrained by having to predict their needs in advance (Comfort, 2020). Customers should be able to book rides as close as possible to their departure time for maximum convenience and utility. Employing technology that provides **real-time information** contributes to customer satisfaction, enabling customers to know their expected wait and pick-up times (Simaiakis, 2020; LaMondia et al., 2018). Door-to-door service offered through the integration of on-demand services can reduce stress among users (Comfort, 2020). **Accessible vehicle design** that accommodates riders who rely on mobility aids is also essential (Frost & Bertucci, 2010). The integration of on-demand and paratransit services can improve riders' trust in public transit agencies (Comfort, 2020).

SERVICE PERFORMANCE



The integration of on-demand services with traditional paratransit services should seek to minimize trip denial rates and improve punctuality. **Low trip denial rates** will ensure that customers can be confident that their trip will reliably be able to be provided (Comfort, 2020; Via, 2020). By ensuring low trip denial rates, customers can further gain confidence in the agency and the potential of the service (Bjerkan & Øvstedal, 2020).

With the integration of enhanced vehicle tracking abilities and scheduling, integrated services should also **improve the punctuality** of pick-up and travel times (Simaiakis, 2020). With improved communications of vehicle locations, route changes or unexpected delays facilitated through improved technology, customers can know that they will have access to reliable information about their trip times (Simaiakis, 2020).

RIDERSHIP SCALABILITY



Two key ridership-related metrics have been determined as success factors for on-demand integration. First, an on-demand system requires the ability to accommodate new ridership. Second, the service levels provided must have the ability to scale upwards or downwards to address future needs. **New ridership** can be accommodated by layering on-demand paratransit services with existing fixed-route transit (Comfort, 2020).

By providing clear, accessible, and time-efficient connections between on-demand paratransit services and existing fixed-route transit, paratransit users have increased freedom to travel regionally (Bjerkan & Øvstedal, 2020, Weinreich et al. 2020). Integrating paratransit with other transit services allows for greater social inclusion and equity (Wasfi et al., 2019; Bjerkan & Øvstedal, 2020). **Service scalability** is necessary for a system to seamlessly address ridership changes across a given region, such as a growth in the population of elderly persons and persons with disabilities. The conventional response of hiring new drivers and expanding fleet can be a costly endeavor given the low-vehicle utilization rate, whereas on-demand model may should for real-time routing adjustments to improve vehicle utilization and reduce these costs (Via, 2020).

FINANCIAL IMPACTS



With the growth of elderly populations and people with disabilities, transit agencies should view investments in paratransit services not solely as a cost but also as a benefit that may offset other government expenditures (CUTA, 2013). Still, agencies need to ensure a level of financial predictability in the *cost of the integrated services* to the agency in order to budget for future changes. The integration of services should seek to improve the overall service for passengers while maintaining or reducing the cost to the agency of delivering a trip (Comfort, 2020; Via, 2020). Large or unpredictable cost increases would make future service planning a challenge. *Fare subsidies* for riders should be predictable and consistent to allow for customer's long-term financial planning. No matter what arrangement is in place with service providers, the customer's fare should be transparent, with revenue splitting managed behind the scenes to ensure a simple and seamless user experience (Bjerkan & Øvstedal, 2020).





Section C:

Case Studies

CASE STUDY SELECTION

To ensure findings are relevant to TransLink, this report evaluates jurisdictions which have taken unique approaches to paratransit and on-demand integration in order to provide an array of options and potential outcomes that can be applied to HandyDART. A focus was placed on jurisdictions which have implemented on-demand paratransit services and those which provide a first-mile/last-mile (FMLM) transit service to align with TransLink's goal of developing a Family of Services approach to enhance paratransit.

A larger sample of North American transportation agencies was first reviewed to ensure our ultimate case study selection reflected comparable geographies and built environments to that of Metro Vancouver. The list was then narrowed down based on the availability of information and reporting to ensure a robust analysis could be completed to understand the local successes and challenges of the selected case studies. A final list of eight cases comprising two Canadian and six American jurisdictions covering a variety of geographies, from urban centres to rural towns, and spanning a spectrum of public to private service delivery approaches. Informational graphics comparing HandyDART and case study jurisdictions are also included throughout this section.

The eight transit agencies that make up our case study analysis are:

1. **Mobility Services** – Guelph Transit – Guelph, ON
2. **HRT Paratransit** – Hampton Roads Transit (HRT) – Hampton, VA
3. **Mobility On-Request** – York Region Transit (YRT) – York Region, ON
4. **GoLink** – Dallas Area Rapid Transit (DART) – Dallas, TX
5. **Mobility On-Demand** – Pinellas Suncoast Transit Authority (PSTA) – Pinellas County, FL
6. **RideKC Freedom On-Demand** – Kansas City Area Transportation Authority (KCATA) – Kansas City, MO
7. **CARE On-Demand** – Greater Richmond Transit Company (GRTC) – Richmond, VA
8. **Mainstream On-Demand** – Central Ohio Transit Authority (COTA) – Central Ohio, OH



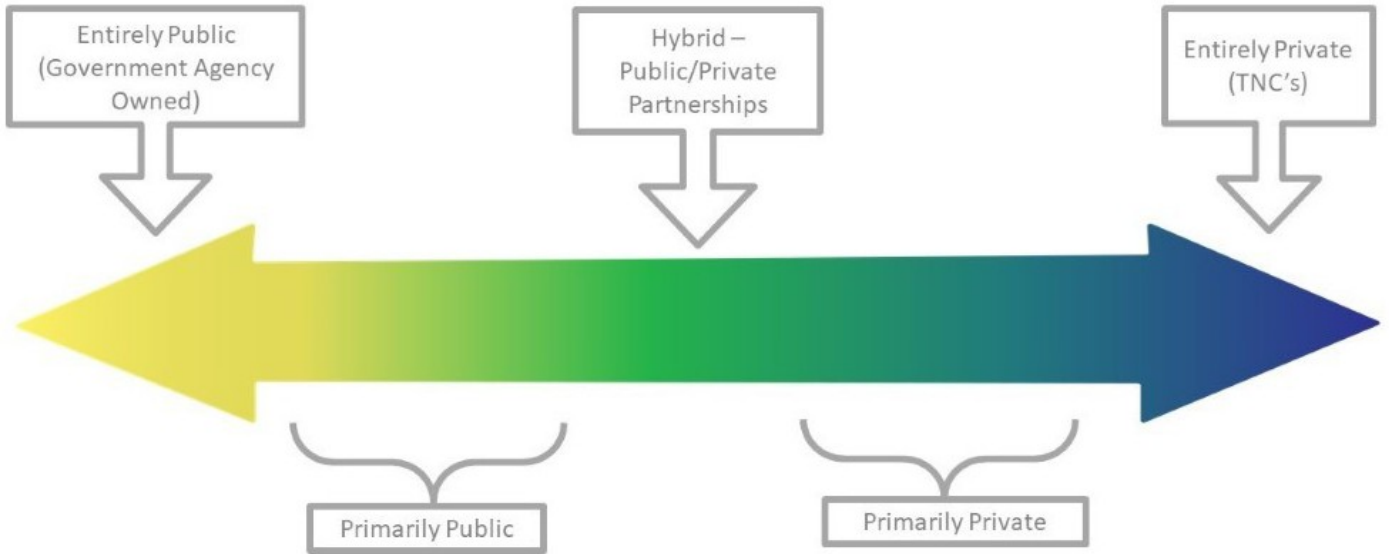


Figure 4. An illustration of public to private operated on-demand services along a spectrum.



Figure 5. An illustration of where the eight selected case studies fall on the on-demand spectrum.



(Aikman, 2015)

MOBILITY SERVICES – GUELPH TRANSIT – GUELPH, ON

OVERVIEW

Mobility Services is a paratransit service in the City of Guelph, Ontario that offers accessible door-to-door transportation through a shared-ride experience within the city's 53 km² service area (City of Guelph, 2020d; RideCo, n.d.). Out of the City's population of 131,794 people (City of Guelph, 2020a), Mobility Services accommodates 1,483 registered paratransit riders for approximately 42,000 rides annually (City of Guelph, 2019). Customers are transported using one of ten vehicles, each with an occupancy of 13 seats (City of Guelph, 2020d; RideCo, n.d.). The City's partnership with RideCo has improved the scheduling and routing components of Guelph's paratransit service through on-demand software (RideCo, n.d.). The collaboration has improved Mobility Services to be nearly on-demand (RideCo, n.d.; City of Guelph, 2020f). Separate from the partnership with RideCo, the City also contracts accessible taxi vehicles through their taxiSCRIP program to supplement Mobility Services as needed (City of Guelph, 2020f).



HandyDART

349
privately
contracted
vehicles

Minimum
24 hours

30 minutes

Average of
\$39.26/trip
to the
agency

VS.



Fleet
Information



Pick-Up
Window



Trip
Booking



Trip
Cost

Mobility Services

10 publicly
operated
vehicles

Minimum
3 hours

20 minutes

Average of
\$32.42/trip
to the
agency

KEY TAKEAWAYS

After partnering with the City of Guelph, RideCo reported an increase in overall ridership for Guelph Transit Mobility Services, with rides arriving on time 95% of the time.

Customers can track their vehicle and receive phone call or text updates about their scheduled trip.

Mobility Services allows riders to schedule their trip over the phone, online, or through a mobile app, providing a more convenient reservation experience.

Table 2. Mobility Services evaluation by selected criteria and metrics.

User Experience	
Registration Process	The registration form is available online. Applicants can submit their completed application by mail or fax. Applicants can expect to receive notice of their application status within 14 days of the application being received. If approved, applicants receive a confirmation letter by mail.
Service Eligibility	Eligibility is restricted to those who are not able to use Guelph Transit’s fixed-route service due to limitations related to their disability. Eligibility criteria includes being physically unable to walk at least 175 metres under any circumstance or with snow or ice and being blind or visually impaired. The taxiSCRIP program is available to Mobility Services customers who have a permanent registration and use a wheelchair or scooter.
Ride Booking Requests	Customers can book a ride over the phone, online, or through the Guelph Transit Mobility Services app (available on Apple and Android). Customers must first create an account over the phone. Through the app, rides may be booked any time during the day. If booking by phone, customers can call Monday-Saturday between 8:00 a.m. and 9:00 p.m. or Sunday between 8:00 a.m. and 4:00 p.m. For taxiSCRIP rides, individuals must book through the participating taxi company, not through Guelph Transit Mobility Services.
Payment Method	Mobility Services payment options follow the same structure that applies to conventional fixed-route transit: cash (exact change), OnYourWay card, day pass, or ticket.
Customer Satisfaction	
Operator & User Training	Successful applicants receive an information package upon approval. The City advertises a training program for persons with a disability who are looking to use conventional services. For Mobility Services, customers can request to practice using the vehicles. For instance, they may wish to practice if using a new scooter.
Trip Coordination	Mobility Services provides a door-to-door service. It is not integrated with conventional fixed-route service and therefore trip coordination is not an option.

Instantaneous Ride Booking	With RideCo’s on-demand software, booking a ride is nearly on-demand as customers can book up to 3 hours before their requested trip (versus the previous 24-hour advanced booking). Customers can also opt to schedule a trip up to 7 days in advance.
Real-Time Information	Customers can receive phone call or SMS message updates regarding their scheduled trip. The Guelph Transit Mobility Services app allows for real-time vehicle tracking and estimated arrival times.
Accessible Design	Buses are fully accessible for riders who rely on wheelchairs. If needed, taxiSCRIP vehicles are also accessible as they are available for Mobility Services users who use a wheelchair or scooter.
Service Performance	
Reducing Trip Denial Rates	No data found.
Improving Punctuality	Buses may arrive within 10 minutes before or after scheduled pick-up time. Drivers will wait 3 minutes for passengers to board. After switching to RideCo on-demand software, Mobility Service punctuality improved, and 95% of buses arrived on time.
Ridership Impacts	
Accommodating Ridership Changes	After collaborating with RideCo, Guelph Transit Mobility Services has seen an improvement in ridership from less than 50% of rides being shared to over 80% of rides being shared. Under-utilized vehicles saw an increase of 7% more passengers per vehicle hour.
Service Scalability	Since Mobility Services already operates throughout the entire city, geographic scalability is not applicable to this case.
Financial Impacts	
Trip Costs	To Agency: Each Mobility Services trip costs Guelph Transit \$32.42. To Customer: Mobility Services rides are \$3.00 cash fare. When paying with the OnYourWay fare card, a single ride is \$2.80 for adults and \$2.25 for youth and seniors. For the taxiSCRIP program, customers can buy \$40 coupon books at a discounted rate of half the price (\$20) at a limit of two books per month.
Fare Subsidies	Since Mobility Services uses the same fare structure as conventional transit, there is no specialized fare subsidy associated with this service.






(Watson, 2020)

HRT PARATRANSIT – HAMPTON ROADS TRANSIT (HRT) – HAMPTON, VA

OVERVIEW

Hampton Roads Transit (HRT) serves a population of over 1.7 million people, covering 1,036 km² across sixteen counties and cities in Virginia’s metropolitan Hampton Roads area (Via, 2020c; HRT, 2020b). Like Metro Vancouver, the HRT transportation network must account for congested tunnels and bridges due to an abundance of inland rivers and waterways across the region (HRT, 2020b). HRT Paratransit is an origin-to-destination shared ride service, with the option of door-to-door service if booking through an app. In 2019, HRT Paratransit provided service to 373,376 passengers with a total of 109 vehicles comprised of vans and taxis (HRT, 2020c; HRT, 2020d). Beginning in February 2020, HRT Paratransit partnered with Via to implement a technology solution to enhance customer experience and increase agency efficiency (Via, 2020b). The partnership included launching the HRT Paratransit app to allow ride booking and trip tracking through a mobile device or web portal (Via, 2020b; Via, 2020c). The Via application uses routing algorithms to ensure that several paratransit rides are shared using one vehicle (Via, 2020b). The multi-year contract with Via includes purchasing 45 new paratransit vans and 20 high-roof vans (Via, 2020b).



HandyDART	349 privately contracted vehicles	Minimum 24 hours	30 minutes	\$3.00/trip to the customer
	VS.	 Fleet Information	 Trip Booking	 Pick-Up Window
HRT Paratransit	109 publicly operated vehicles	Minimum day before	30 minutes	\$3.50/trip to the customer

KEY TAKEAWAYS

As of October 2020, HRT Paratransit has received 491 trip reviews from HRT Paratransit App users, with 94% of trips receiving 4 or 5 out of 5 stars.

Technology integration allows for self-service booking, real-time trip information, and the option to use interactive voice response.

Offers an incremental, customer-oriented approach to enhancing paratransit, with the opportunity to easily adopt on-demand services in the future.

Table 3. HRT Paratransit evaluation by selected criteria and metrics.

User Experience	
Registration Process	Applicants can call a toll-free number to request an application by mail or complete an application online through ADARide. ADA requires an approval turnaround time of 21 days.
Service Eligibility	Customers must meet eligibility criteria and service qualifications in order to use HRT Paratransit. Eligibility follows ADA regulations and is strictly limited to "persons who, because of their disability, are unable to use the fixed route public transit service" (HRT, 2016).
Ride Booking Requests	Customers can book by phone or through the HRT Paratransit mobile app or web portal. Whether booking by phone or app, new bookings are only permitted during call centre hours, between 8:00 a.m. to 5:00 p.m. 7 days a week.
Payment Method	Fares are paid with cash (exact change) or pre-purchased tickets. If customers have a registered account on the HRT Paratransit app, they can pay with their credit card on file.
Customer Satisfaction	
Operator & User Training	Drivers receive sensitivity and program training and undergo background checks and drug testing (Via, 2020a). Via call centre agents receive continuous training, including over 100 hours between June and September 2020 (Via, 2020a). The paratransit website has three instructional videos for customers on how to use the app: one on first-time login and menu options, one on booking rides, and one on managing scheduled rides.
Trip Coordination	HRT’s paratransit service works alongside fixed-route services in a “demand-response” capacity. The service is origin-to-destination and is not integrated with fixed-route transit.
Instantaneous Ride Booking	Booking is instantaneous through the HRT Paratransit app, but only during call centre hours. Riders must book a trip by 5:00 p.m. the day before, or a maximum of 7 days in advance.
Real-Time Information	The mobile app and online portal provide real-time information including location of pick-up vehicle, vehicle license plate number, estimated time of arrival, trip route, and current location during the trip.

Accessible Design HRT Paratransit uses accessible lift vans, non-lift vans, and sedans. Via has added an interactive voice response to their app to provide customers with information on an upcoming trip.

Service Performance

Reducing Trip Denial Rates No data found.

Improving Punctuality Pick-ups arrive within a 30-minute window, 15 minutes before or after scheduled pick-up time. Drivers are required to wait up to 5 minutes for a passenger. On-time performance is updated live on HRT Paratransit's main webpage. In October 2020, HRT set a goal of maintaining 95%+ on-time performance. During fall 2020, on-time performance steadily increased from 80%, hovering around 97-100%.

Ridership Impacts

Accommodating Ridership Changes HRT Paratransit, in partnership with Via, is seeking to expand driver hours to accommodate growing demand in paratransit service. The partnership with Via has expand the supply of drivers. Technological innovation allows HRT's paratransit services to efficiently adjust to fluctuating demand.

Service Scalability Taxis and TNCs have been added to the existing HRT Paratransit fleet in response to increased demand in paratransit services. Taxis were added in July 2017. TNCs were added in June 2020. According to an October 2020 presentation by Via to the HRT Paratransit Advisory Committee, Via has expanded driver supply to better meet demand.

Financial Impacts

Trip Costs **To Agency:** No data found.
To Customer: Paratransit riders pay \$3.50 one-way for each trip. As of 2016, eligible paratransit customers who present their Paratransit photo ID may use fixed-route services (bus, ferry, and light rail) free of charge.

Fare Subsidies No data found.






MOBILITY ON-REQUEST – YORK REGION TRANSIT (YRT) – YORK REGION, ON

OVERVIEW

York Region Transit (YRT) serves an area of 1,776 km² and a population of 1.2 million people (York Region Transit, 2019a). In 2016, the Region introduced the East Gwillimbury and Georgina pilot combining on-demand transit with paratransit services (York Region Transit, 2019b). YRT determined that it was most efficient and effective to combine the services, which led to the creation of the regional Mobility On-Request (MOR) with Mobility On-Request Paratransit (MORP) as a sub-service (York Region Transit, 2017). MOR is a ride-sharing first-mile/last-mile service that uses a Family of Services model to combine on-demand with conventional transit. Any transit customer can use this service. MOR Customers are picked up at a fixed address and taken to conventional transit stops and popular destinations in their communities. The Mobility On-Request 65+ service (MOR65+) is available exclusively to seniors and transports seniors on-demand to a destination within 5 km of their pick-up location (York Region Transit, 2020a). York Region's Mobility On-Request Paratransit (MORP) is an on-demand paratransit service with accessible vehicles to users who meet eligibility criteria. YRT partners with private contractors who operate the 125 vehicles used for MOR/MORP. Routematch provides software for trip scheduling (York Region Transit, 2019a). Due to the large size of York Region, service areas are separated into smaller zones. At first YRT only implemented on-demand service within a few zones, however, the service area is steadily expanding with the goal of providing on-demand in all zones (York Region Transit, 2017).



HandyDART	349 privately contracted vehicles	Minimum 24 hours	30 minutes	Average of \$39.26/trip to the agency
	VS.	 Fleet Information	 Trip Booking	 Pick-Up Window
Mobility On-Request	125 privately contracted vehicles	1 to 2 hours	Not applicable	\$7.00 to \$40.00/trip

KEY TAKEAWAYS

YRT efficiently integrates MOR services with fixed-route transit using a Family of Services model through the YRT On-Demand app which allows users to coordinate their entire trip in one place.

The MOR65+ service can accommodate an aging population that needs some assistance but does not need the extent of service offered with the Region’s paratransit services.

MOR shares paratransit vehicles with non-paratransit on-demand service in areas with low ridership contributing to cost savings for the agency.

Table 4. Mobility On-Request evaluation by selected criteria and metrics.

User Experience	
Registration Process	MOR65+ has no registration process. To register for MORP customers must complete an application form by downloading it from the YRT website or calling to request a hard copy. Applicants, as well as physicians, must complete an application form. Both forms can be mailed, emailed, or faxed to YRT. It takes 14 days to determine eligibility.
Service Eligibility	MORP+: Anyone 65 and over in qualifying service zones is eligible. MORP: The eligibility requirements include persons with a physical disability who cannot walk a minimum of 175 m, persons with a cognitive disability that impacts their ability to use conventional transit, and persons who are legally blind and cannot use conventional transit service. There are three types of eligibility: unconditional, temporary, and conditional.
Ride Booking Requests	MOR: Customers can book on the app or by telephone. MOR65+/MORP: Customers must call. There is no mobile or web option. The online booking option was discontinued for MOR65+ and MORP as of December 31, 2019.
Payment Method	All Mobility On-Request services use the same fare and payment methods as conventional transit, which includes cash, presto, monthly pass and the YRT pay app.
Customer Satisfaction	
Operator & User Training	There is a user travelling guide for MORP customers. The myRide travel training program assists customers of all ages and abilities in learning how to take transit independently. The program consists of train-the-trainer presentations, individual travel training, and transit overview presentations for community organizations.
Trip Coordination	The app for MOR allows the entire trip to be planned in one place, not just the on-demand portion. The MOR65+ service can bring customers to conventional transit but does not coordinate the conventional transit portion of trip. If a MORP customer is travelling to a different municipality, they must book the entire trip with MORP. In this case, riders must transfer from one municipality's paratransit service to another's at a designated pick-up point.

Instantaneous Ride Booking	<p>MOR: Customers can book a trip up to 1-2 hours in advance depending on the zone they are located in.</p> <p>MORP: Customers must call to book a ride by at least 4:00 p.m. the day before and up to 7 days in advance.</p> <p>MOR65+: Customers can call the same day to book a trip. A dispatcher will call them back with a confirmed time within 60 minutes of their requested pick-up time.</p>
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Real-Time Information	<p>The MOR service includes an app that provides updated pick-up information for customers. MOR65+ and MORP have no real-time information technology.</p>
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Accessible Design	<p>The vehicle fleet includes sedans, accessible mini vans, buses, and minibuses. Customers can select from a variety of accommodations in the app, such as accommodations for those visually or hearing impaired, travelling with a mobility aid, service animal, bicycle, or child.</p>
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Service Performance

Reducing Trip Denial Rates	<p>No data found.</p>
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Improving Punctuality	<p>On-time performance and advanced booking time have improved by having three contractors that provide sedans and accessible mini-vans.</p>
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Ridership Impacts

Accommodating Ridership Changes	<p>MOR and MORP use the same vehicle fleet allowing for increased speed and availability of service. On-demand ridership increased from 10,643 riders in 2016 to 27,120 riders in 2018, an increase of 155%. Three contractors complete the majority of MOR rides using sedans and accessible vans. An additional contractor operates buses and mini-buses in areas with greater anticipated ridership or for customers who cannot be accommodated by a sedan or mini-van.</p>
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Service Scalability	<p>YRT uses a zone-based service model that has outperformed all other models from a customer cost and operational perspective. The Region’s goal is to implement MOR in every zone in the future.</p>
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Financial Impacts

Trip Costs	<p>To Agency: The operating cost per passenger trip is \$7.00-\$40.00. To Customer: MOR fare is \$4.25 (cash) or \$3.88 (presto).</p>
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Fare Subsidies	<p>No data found.</p>
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(FTA Research, 2020)

GOLINK – DALLAS AREA RAPID TRANSIT (DART) – DALLAS, TX

OVERVIEW

Dallas Area Rapid Transit (DART) provides fixed-route and paratransit to the 5 million people living within the 3,645 km² that make up the Dallas-Fort Worth area. In 2016, the United States Federal Transit Authority put out a call to public transportation providers to pilot “Mobility On-Demand (MOD) Sandbox Projects” (DART, 2020). DART was awarded \$1.2 million to demonstrate on-demand's potential to address FMLM gaps. DART created GoLink to pilot the use of on-demand transit within the region, allowing customers to request rides through the GoPass app (GoPass, 2020). GoPass uses Spare Labs software to establish anchor destinations along major fixed-route bus and train stations, using small buses to provide FMLM connections to these destinations (GoPass, 2020). DART has not offered on-demand nor booking technologies that are solely dedicated to paratransit customers. With the addition of GoLink, all transit customers, including paratransit customers have the option to book through a mobile app and use on-demand service (DART, 2020). DART partnered with UberPool to help expand their fleet to include a sufficient number of accessible vehicles and to meet increased demand (DART, 2020). Although GoLink on-demand is not a dedicated paratransit service, DART ensures that people with disabilities are accommodated by ensuring accessible vehicles are available, integrating specialized paratransit service requests within the GoPass application, and taking and reflecting paratransit user feedback within the system.



HandyDART

349
privately
contracted
vehicles

Minimum
24 hours

30 minutes

Average of
\$39.26/trip
to the
agency

VS.



Fleet
Information



Trip
Booking



Pick-Up
Window



Trip
Cost

GoLink

Public and
private
operated
vehicles

Instant

6-7 minutes

\$5.00 or
\$16.37/trip
to the
agency

KEY TAKEAWAYS

Moving away from specialized services towards universal design benefits paratransit customers.

Prioritizing FMLM anchor destinations allows customers to connect to fixed-route stations, exemplifying a Family of Services approach.

TNC partnership enabled the agency to scale to adjust to changes in demand.

Table 5. GoLink evaluation by selected criteria and metrics.

User Experience	
Registration Process	There was no registration for people with disabilities as the pilot is not a dedicated paratransit service.
Service Eligibility	The program was available to residents in area. While not specifically tailored to people with disabilities, the program complies with ADA legislation.
Ride Booking Requests	Customers can book by phone, online, or through a regional mobile app. As a result of challenges negotiating with TNCs, Dart had Spare Labs create an app, called GoPass. To meet growing demand, DART integrated the app with the UberPool app.
Payment Method	Customers can pay with GoPass Wallet through the GoPass app. The app allows for payment using PayPal, ApplePay, and other internet payment services. For unbanked customers, the agency has approximately 900 PayNearMe stations where cash can be used to load accounts.
Customer Satisfaction	
Operator & User Training	All drivers were required to submit a background check of their driving and criminal records. DART provides driver training, however, training is not specifically related to paratransit service. One-on-one instruction travel training is provided for customers.
Trip Coordination	The GoLink pilot program provides a FMLM solution by connecting customers from origin to preset destination anchor points including fixed-route stations and popular community destinations. Customers can pay extra to be dropped off at personalized destinations, like door-to-door service.
Instantaneous Ride Booking	On-demand requests are booked instantaneously, whereas the demand-response DART on-call paratransit service requires one-day advanced booking.
Real-Time Information	Through the app, customers receive real-time information including trip route, scheduling, fare payment, and information about nearby events.
Accessible Design	Not all participating vehicles are accessible. Participating TNC’s must offer accessible options.

Service Performance

Reducing Trip Denial Rates No data found.

Improving Punctuality Wait times differed for people using accessibility vehicles. The average wait time was 5-13 mins, whereas wait time for people with disabilities was 6-7 min.

Ridership Impacts

Accommodating Ridership Changes The introduction of GoLink increased ridership in underserved areas. In two previously underserved service areas, ridership increased by 200% and 60%, respectively. The UberPool partnership increased ridership across all on-demand service areas. Paratransit user satisfaction increased from 58% with only the conventional network to 89% following the integration of on-demand service.

Service Scalability When the pilot launched, GoLink encompassed 44% of the total DART service area. The program has since expanded to cover 82% of the network and is continuing to grow. Partnering with UberPool to provide FMLM service has relieved DART from constrained supply of vehicles and drivers. This allows DART to continue expanding their internal fleet while providing effective service.

Financial Impacts

Trip Costs **To Agency:** DART received cost-savings of over 50% when underutilized fixed-routes were replaced with on-demand service. However, costs increased when establishing on-demand in previously unserved areas. **To Customer:** Trips using GoLink on-demand service cost \$2.50. If passengers have already paid their fare for a fixed-route transit trip, the GoLink trip is included at no additional cost. Trips using UberPool cost \$1.00 for locations within an identified service area surrounding destination anchors. Trips outside the service area cost \$3.00.

Fare Subsidies On average, DART subsidized \$16.37 towards the fare per GoLink trip. DART subsidized \$5.00 per UberPool trip.



(PSTA, 2020)

MOBILITY ON-DEMAND – PINELLAS SUNCOAST TRANSIT AUTHORITY (PSTA) – PINELLAS COUNTY, FL

OVERVIEW

The Pinellas Suncoast Transit Authority provides conventional and paratransit service to 978,045 residents living in the 725 km² region of Pinellas County, Florida. With the help of a federal grant in 2016, the Pinellas Suncoast Transit Authority (PSTA) launched its Mobility On-Demand (MOD), Direct Connect, and TD Late Shift services (PSTA, 2020a). Direct Connect is a FMLM connection to 24 frequent bus stops and rides are delivered via Uber’s mobile application or by calling a contracted taxi or WAV provider. Customers receive a \$5 discount on Uber and taxi rides and a \$25 discount on WAV rides (PSTA, 2020c). TD Late Shift provides up to 25 free monthly overnight on-demand rides for low-income customers who are otherwise unable to make essential trips for work, medical appointments, groceries, etc. Customers pay \$20 per month for a TD Late Shift pass and book rides through the PSTA call centre (PSTA, 2020e). MOD provides on-demand door-to-door paratransit service with a \$4.50 per ride cost to customers, and rides are booked via an app or through the PSTA Call Centre. (PSTA, 2020a). PSTA’s use of targeted programs to meet unique needs reflects the ambitions of the *Family of Service* approach.



HandyDART

349
privately
contracted
vehicles

Minimum
24 hours

30 minutes

Average of
\$39.26/trip
to the
agency

VS.



Fleet
Information



Trip
Booking



Pick-Up
Window



Trip
Cost

Mobility On-Demand

Privately
contracted
vehicles

Instant

Not
applicable

\$5.00 or
\$25.00/trip
to the
agency

KEY TAKEAWAYS

Targeted programs with a mix of fare and subsidy caps to meet user needs.

Combination of FMLM and point-to-point services moves towards *Family of Services* approach.

Working to integrate various programs & information under single accessible app/interface to customer's improve ease of use.

Table 6. Mobility On-Demand evaluation by selected criteria and metrics.

User Experience	
Registration Process	PSTA administers registration for accessible on-demand services. Applicants are required to call to request an application form and participate in a 30-minute mobility consultation over the phone. Applications are processed within 21 days.
Service Eligibility	On-demand services are available to riders with or without disabilities, to receive paratransit trip subsidies, customers must be eligible for traditional paratransit service determined by ADA regulations.
Ride Booking Requests	On-demand rides can be booked through their respective TNC apps and call centres.
Payment Method	Customers can pay with cash, credit, or debit cards. For WAV taxi rides, fares are paid on the vehicle directly to the driver.
Customer Satisfaction	
Operator & User Training	While Uber, Lyft, and Taxi operators receive basic non-ADA training from their employers, WAV provider Wheelchair Transport ensures all operators receive ADA training. PSTA offers one-on-one travel training for paratransit customers to learn how to use the conventional network. Trainers will accompany riders and develop individualized travel plans.
Trip Coordination	Coordination between modes is left up to the customer’s trip planning capabilities. For assistance in planning a trip, customers can phone a call centre operated by PSTA.
Instantaneous Ride Booking	Rides can be booked instantaneously for Lyft and Uber through their apps. WAV rides are booked through a call centre. Operators are then dispatched by their respective employers, with pick-up times based on current availability and traffic conditions.
Real-Time Information	Customers booking through Transit App, Uber, or Lyft app can track vehicle location in real-time. For WAV users there is no real-time tracking.
Accessible Design	The fleet is not dedicated to paratransit services, so not all vehicles are accessible. However, customers can request an accessible vehicle.

Service Performance

Reducing Trip Denial Rates No data found.

Improving Punctuality No data found.

Ridership Impacts

Accommodating Ridership Changes By providing multiple on-demand services that target specific user needs, PSTA meets the needs of a greater number of paratransit customers whose travel plans cannot be accommodated solely through fixed-route transit or traditional paratransit.

Service Scalability If service needs to be increased, contractors will allocate additional operators to carry out service. If demand decreases, the PSTA bears no negative consequences since only trips that are taken are paid for and delivered.

Financial Impacts

Trip Costs

To Agency:
Direct Connect: PSTA pays up to a \$5 for discounted Uber rides and \$25 for WAV rides.
TD Late Shift & Mobility On-Demand: Insufficient information available.

To Customer:
Direct Connect: Variable per trip costs.
TD Late Shift: \$20/month for 25 eligible trips.
Mobility on Demand: \$4.50 per trip.

Fare Subsidies For both TD Late Shift and Mobility On-Demand, customer fares are set at a fixed rate and PSTA covers the difference. With the Direct Connect program, the agency covers \$5 for Uber trips and \$25 for service taxi rides, and the customer pays the rest of the cost.



(Turque, 2018)

RIDEKC FREEDOM ON-DEMAND – KANSAS CITY AREA TRANSPORTATION AUTHORITY (KCATA) – KANSAS CITY, MO

OVERVIEW

In May 2017, the Kansas City Area Transportation Authority (KCATA) began a pilot program for on-demand transit service, called RideKC Freedom On-Demand (RideKC, 2018). RideKC Freedom On-Demand is available for both conventional and paratransit customers. The program complements the existing RideKC Freedom conventional paratransit service. To implement the on-demand option, KCATA partnered with Transdev, which owns local shuttle and taxi service (Roberts, 2017), to provide a fleet of at least 450 vehicles and drivers to operate them (Canon, 2017). Transdev's fleet and booking infrastructure allows riders to book trips depending on their needs, accommodating all types of transit customers. As the pilot progressed and became a permanent fixture in the Kansas City transportation system, it expanded from specific areas in Kansas City to other areas including all of Wyandotte and Johnson counties, and Independence, Missouri serving over 1.38 million people. A news release sent out by RideKC indicates that customers have been satisfied with the new on-demand service, with 75% to 80% approving of the service (RideKC, 2017b).



HandyDART

349
privately
contracted
vehicles

Minimum
24 hours

30 minutes

Average of
\$39.26/trip
to the
agency

VS.



Fleet
Information



Trip
Booking



Pick-Up
Window



Trip
Cost

RideKC Freedom On-Demand

450
Privately
contracted
vehicles

Instant

Not
applicable

Average of
\$15.00/trip
to the
agency

KEY TAKEAWAYS

Less expensive, bring costs down from \$27 to \$15 to deliver service.

Relatively comprehensive conditional eligibility taking into account mobility limiting factors such as weather.

Employs a taxi fleet in an on-demand ride-sourced style.

Table 7. RideKC Freedom On-Demand evaluation by selected criteria and metrics.

User Experience	
Registration Process	Applicants can receive the registration form by downloading, requesting by email, calling for a mail version, or picking up in person. Forms are completed online, by email, or by mail. In-person assessment is performed by RideKC Freedom. Results of the assessment are communicated by mail within 21 days, as per ADA turnaround time.
Service Eligibility	Eligibility for RideKC Freedom is determined through ADA guidelines. Users are granted unconditional or conditional access based on factors such as weather or destination/starting point that may limit their ability to access the conventional transit system. All transit customers are eligible for RideKC Freedom On-Demand.
Ride Booking Requests	RideKC Freedom: Customers may book by phone only. RideKC Freedom On-Demand: Customers may book by phone or app for on-demand, curb-to-curb service. Booking is available 24/7 via the app.
Payment Method	RideKC Freedom: Customers can pay with cash. RideKC Freedom On-Demand: Customers can pay with cash, credit, or debit card in their taxi ride.
Customer Satisfaction	
Operator & User Training	RideKC Freedom: There is a travel training program which is undergoing changes and optional training on using fixed-route services. RideKC Freedom On-Demand: Drivers are trained as taxi drivers but not specifically for paratransit support. Drivers are background checked. Transit customers can view an FAQs page, but there is no specific user training. Customers unfamiliar with booking through an app can contact the call centre to walk through the process.
Trip Coordination	RideKC Freedom is not integrated with the standard fixed route system. Customers are given point to point service anywhere within $\frac{3}{4}$ of a mile of a transit stop. RideKC Freedom On-Demand allows customers to travel anywhere within the service area. It is not integrated with the fixed-route system.
Instantaneous Ride Booking	RideKC Freedom On-Demand rides can be booked instantly through the app or over the phone. Response time is similar to taxis or other ridesharing services. This marks a change from the RideKC Freedom system that required booking a day in advance.

Real-Time Information	No data found.
Accessible Design	The taxi fleet used for RideKC On-Demand is not fully accessible. Only some vehicles will be able to service those with specific accessibility needs.
Service Performance	
Reducing Trip Denial Rates	No data found.
Improving Punctuality	RideKC Freedom has a pick-up window of 30 minutes. RideKC Freedom On-Demand vehicles pick-up as the rider requests.
Ridership Impacts	
Accommodating Ridership Changes	As of October 2018, Freedom On-Demand was slated to surpass 100,000 total trips for persons with disabilities, with ridership now in the range of carrying 150-200 person per day.
Service Scalability	KCATA's responsibility to adapt to scalability is removed because Transdev handles accommodating new demand. Transdev must hire and train taxi drivers and paratransit vehicle drivers if they must accommodate more riders.
Financial Impacts	
Trip Costs	<p>To Customer: RideKC Freedom: Rides are a fixed cost of \$2 or \$3 depending on area. RideKC Freedom On-Demand: For seniors and paratransit users, the first 5 miles of a trip are charged at a flat rate of \$5. An additional \$2 is charged for every extra mile per trip. For all other users, the first 5 miles of a trip are charged at flat rate of \$10. An additional \$2 is charged for every extra mile per trip.</p> <p>To Agency: KCATA saved \$166,000 from its paratransit service after the first 5 months of providing on-demand service. The average cost to operate RideKC Freedom is \$27.13 per trip. The average cost to operate RideKC Freedom On-Demand was \$15 for paratransit users and seniors. Cost to operate for all other users ranged between \$9 - \$10 per trip.</p>
Fare Subsidies	No data found.



(Our Health, 2020)

CARE ON-DEMAND – GREATER RICHMOND TRANSIT COMPANY (GRTC) – RICHMOND, VA

OVERVIEW

The Greater Richmond Transit Company (GRTC) provides fixed-route and paratransit services to the 1,281,708 people living in the 588 km² service area of the City of Richmond, Henrico County and Chesterfield County (GRTC, 2018b). To improve service for its paratransit customers, the GRTC launched the CARE On-Demand transit service in 2017 to complement its traditional paratransit service. CARE On-Demand provides paratransit customers with a door-to-door option, covering the same service area as the GRTC’s conventional network (GRTC, 2017). The service is delivered by two contracted firms, UZURV and Roundtrip, who manage booking, dispatching, vehicles and driver contracting and training. Rides are booked through both mobile and web applications and call centres, with rides being dispatched immediately through Roundtrip’s software ecosystem (Roundtrip, 2020). UZURV and Roundtrip deliver rides through partnerships with Uber and Lyft, and wheelchair- accessible vehicles are provided by subcontracted fleet operators to offer accessible rides (GRTC, 2018a). By subcontracting service to TNCs, service is easily scalable to meet changing demands. The use of two service contractors with different booking interfaces allows paratransit customers a choice in how they travel. The program demonstrates how using a decentralized model with subcontracted TNCs can allow for rapid scalability as service demand changes.



HandyDART

349
privately
contracted
vehicles

Minimum
24 hours

30 minutes

Average of
\$39.26/trip
to the
agency

VS.



Fleet
Information



Trip
Booking



Pick-Up
Window



Trip
Cost

CARE On-Demand

Privately
contracted
vehicles

Instant or
minimum
1 hour

Not
applicable

Up to
\$15.00/trip
to the
agency

KEY TAKEAWAYS

Serving +11% of all paratransit rides within 3 years of launch, with estimated \$500,000 agency savings in 2019.

Successful Travel Training Program shifted 12,584 trips to conventional network.

Multi-TNC partnerships allow customer choice on how they ride, while providing agency with scalability.

Table 8. CARE On-Demand evaluation by selected criteria and metrics.

User Experience	
Registration Process	Applicants must request a mail-in form or complete an online form and provide physician verification of their needs. Process administration is contracted to ADAride, which reviews applications and conducts follow-up with the applicant. As per ADA, applications must be processed within 21 days.
Service Eligibility	CARE On-Demand customers must meet ADA legislation eligibility requirements. Customers over 80 years old automatically qualify.
Ride Booking Requests	UZURV: Bookings are made by contacting the UZURV call centre. Customers must have their ADA I.D. number ready to provide. Rides can only be booked during UZURV operating hours, Monday-Friday: 5:30 a.m. to 10:00 p.m. or Sunday 7:30 a.m. to 7:30 p.m. It is unclear how riders with hearing impairments can access UZURV service. Roundtrip: Customers can book online, through a mobile app, or by phone between 7:00 a.m. to 11:00 p.m.
Payment Method	CARE On-Demand customers can only pay by credit and debit card which limits service options for unbanked customers.
Customer Satisfaction	
Operator & User Training	UZURV, Roundtrip and WAV contractors deliver operator training. Training is required to meet ADA standards. GRTC provides in-person travel training to familiarize customers with conventional fixed-route services. Customer feedback is overwhelmingly positive and 12,584 total trips were shifted from paratransit to the conventional network in 2019 as a result.
Trip Coordination	CARE On-Demand trips are not coordinated between modes. Customers must coordinate connection routes and schedules themselves.
Instantaneous Ride Booking	UZURV: 1 hour advance notice required. Roundtrip: No-advanced booking requirement. Operators dispatched immediately upon request.
Real-Time Information	UZURV provides the option for users to receive text-message notifications on the status of their ride. Roundtrip's app allows customers to track their vehicle location in real-time and drivers can communicate directly with them about any issues or delays.

Accessible Design	Accessible vehicles are available to riders who request them at time of booking.
Service Performance	
Reducing Trip Denial Rates	No data found.
Improving Punctuality	CARE On-Demand demonstrates an on-time performance of 97% aggregated between service providers.
Ridership Impacts	
Accommodating Ridership Changes	TNC contracting allows CARE On-Demand to immediately and meet ridership demands instantaneously by matching with active qualified Uber/Lyft/WAV operators in the region.
Service Scalability	CARE On-Demand provides ease of scalability for transit agencies by reducing the need to purchase fleets and hire operators. If demand increases, UZURV and Roundtrip will complete the additional ADA training for already active Uber and Lyft drivers to respond. If demand decreases, the GRTC bears no negative consequences since rides are paid for and delivered only if taken.
Financial Impacts	
Trip Costs	<p>To Agency: The cost borne by GRTC is capped at \$15 which is roughly half the \$29 cost of the GRTC traditional paratransit service.</p> <p>To Customer: Customers pay an initial flat rate of \$6. GRTC covers the next \$15 of the cost and amount beyond is paid by the customer. Fare tables are provided by both UZURV and Roundtrip for customers to reference. Rides booked through Roundtrip between 8 p.m-6:30 a.m. are subject to a \$1 overnight premium surcharge. Rides booked through Roundtrip’s online options receive a 15% discount.</p>
Fare Subsidies	The agency pays up to \$15 of the fare per trip. Customers wishing to take more expensive trips will pay the difference themselves. By implementing a maximum subsidy, service planning and costs are predictable and known. To-date, the partnership with Roundtrip has saved over \$100,000 compared to if these rides were delivered by traditional paratransit.



(First Transit, 2020)

MAINSTREAM ON-DEMAND – CENTRAL OHIO TRANSIT AUTHORITY (COTA) – CENTRAL OHIO, OH

OVERVIEW

The Central Ohio Transit Authority (COTA) provides transit and paratransit service to the 1.2 million people residing in the Greater Columbus metropolitan area. The authority provides two paratransit services, COTA Mainstream and COTA Mainstream On-Demand with the former service being operated by COTA and the latter being contracted out to the TNC, UZURV (Central Ohio Transit Authority, n.d.a). COTA Mainstream On-Demand launched in 2019 to expand the availability of paratransit services across the region, focusing on service delivery for Non-ADA Paratransit Trips. COTA contracted UZURV to provide and improve the reliability of their paratransit service and offer more flexibility to paratransit customers (Columbus Advisory Committee on Disability Issues, 2019). However, since COTA has maintained its traditional paratransit service, the UZURV provided trips are supplementary and are considered as Non-ADA Paratransit Trips meaning users are subject to a different fare structure and booking policies (Central Ohio Transit Authority, n.d.a). By partnering with UZURV, COTA increased their paratransit fleet by adding an additional 40 vehicles, substantially increasing service capacity. COTA Mainstream On-Demand ride must be booked by phoning the UZURV call centre, and the service does not offer the ability to book online or through a mobile app; however, customers receive real-time updates on their ride by opting in to text messaged notifications (Central Ohio Transit Authority, n.d.a).



HandyDART

349
privately
contracted
vehicles

Minimum
24 hours

30 minutes

Average of
\$39.26/trip
to the
agency

VS.



Fleet
Information



Trip
Booking



Pick-Up
Window



Trip
Cost

Mainstream On-Demand

74 public
and 40
private
vehicles

Minimum
1 hour

Varies

\$5.00 for
the first 5
miles and
\$1.00/extra
mile

KEY TAKEAWAYS

Instant scalability of paratransit service by partnering with a TNC. Paratransit vehicle went from 74-vehicle fleet to 114 vehicle fleet.

Specialized training for UZURV agents emphasizes customer service. Rapport between drivers and customers created through driver matching.

Inability to pay for on-demand service without a credit/debit card can make the service inaccessible to unbanked customers.

Table 9. Mainstream On-Demand evaluation by selected criteria and metrics.

User Experience	
Registration Process	Applicants must fill out an ADA paratransit eligibility form. Following submission, applicants arrange an in-person interview and functional assessment. ADA requires an approval turnaround time of 21 days.
Service Eligibility	Eligibility is based on the ADA criteria for “functional ability.” COTA Mainstream On-Demand and COTA Mainstream services provide a “safety net” for those whose “functional capacity imposed by their physical disability prevents them from riding the regular COTA bus” (COTA, n.d.a).
Ride Booking Requests	Bookings are scheduled by calling the UZURV call centre. Customers must have their ADA I.D. number ready to provide. Rides can only be booked during UZURV operating hours, Monday-Friday: 5:30 a.m. to 10:00 p.m. or Sunday 7:30 a.m. to 7:30 p.m.
Payment Method	COTA Mainstream customers can pay by cash, tickets, or a monthly pass. COTA Mainstream On-Demand customers pay by credit or debit card directly to UZURV. This happens during booking, prior to travel.
Customer Satisfaction	
Operator & User Training	UZURV drivers receive ADA sensitivity training, CPR, and first aid. COTA and UZURV provide customers with information on how to book rides, cancel trips, and identify their vehicle and driver through a tip sheet.
Trip Coordination	COTA Mainstream On-Demand is a point-to-point paratransit service. There is no integration between Mainstream On-Demand and the rest of COTA’s services. UZURV drivers are required to wear easily distinguishable red shirts that have COTA and UZURV branding. Since UZURV vehicles are private, they must have a UZURV sticker placed on the front windshield to help customers identify the vehicle.
Instantaneous Ride Booking	Trips can be booked from 30 days and up until 1 hour prior to a user’s departure time when using COTA Mainstream On-Demand, improving upon the 24 hour advance notice required by COTA Mainstream.
Real-Time Information	UZURV provides the option for users to receive text-message notifications on the status of their ride. Text message alerts include information regarding the driver, the licence plate number and a description of the vehicle, and an estimated time.

Accessible Design COTA Mainstream On-Demand offers wheelchair accessible vehicles, even though the service prioritizes non-ADA paratransit service. UZURV drivers operate their own private vehicles meaning the company provides accessible vehicle service through contracting an accessibility focused transportation company known as Tristar.

Service Performance

Reducing Trip Denial Rates No data found.

Improving Punctuality By alleviating demand for Non-ADA Paratransit Trips on the COTA Mainstream paratransit service, Mainstream On-Demand has allowed more vehicles to operate.

Ridership Impacts

Accommodating Ridership Changes In its first year of operations, COTA Mainstream On-Demand transported 16,869 customers. Paratransit ridership increased by 5% between 2018 and 2019 through introduction of COTA Mainstream On-Demand and the continuing operations of COTA Mainstream, increasing annual usage from 291,455 trips to 305,559 trips.

Service Scalability Prior to the partnership with UZURV, COTA Mainstream provided 74 dedicated paratransit vehicles. With the addition of COTA Mainstream On-Demand, an additional 40 on-demand vehicles were added to COTA's available paratransit fleet.

Financial Impacts

Trip Costs **To Agency:** No data found.
To Customer: The first 5-miles of a trip are charged at a flat rate of \$5. An additional \$1 is charged for every extra mile per trip.

Fare Subsidies Customers using COTA Mainstream On-Demand do not receive a discounted rate of travel due to the service being a Non-ADA Paratransit trip.



Section D:

Best Practices and Gap Analysis

DETERMINING BEST PRACTICES

To determine the best practices for enhancing paratransit service delivery, integrating on-demand, and moving towards a Family of Services approach to service delivery, we reviewed the literature, organizational reports, case study findings, and insights learned from industry professional mentors. Academic sources, news articles, transportation association reports, and legislation documents guided initial identification of where the transportation industry is moving with respect to integrating on-demand service delivery. Because the shift from demand-response paratransit to on-demand service is so new, with transit agencies across North America only recently piloting on-demand and real-time technologies, we relied more on findings from our case studies to determine industry best practices. For example, the Americans with Disabilities Act (ADA) defines a 30-minute or less pick-up window as an industry-wide standard. However, some of the agencies we studied guarantee shorter pick-up windows, offering paratransit customers increased flexibility and closing the service experience gap between custom transit customers and those using fixed-route services.

KEY INDUSTRY LEARNINGS

Discussions with transportation professionals in the areas of consulting, executive management, regulation, and private sector software, provided insight into longer-term and more recent trends in enhancing paratransit services and the benefits of on-demand integration. Key learnings from industry mentors include:

- Universal design across fixed-route and custom transit service delivery and infrastructure can facilitate a Family of Services approach that is more efficient and allows for better trip coordination for the agency and customer; this moves away from the siloed approach of specialized services.
- Conditional eligibility coupled with universal design can provide customers with services and vehicles that best meet their needs while ensuring that people who can take conventional transit can do so when possible while still accessing paratransit when needed.
- The optimization of an in-house fleet across paratransit and fixed-route services can boost efficiency and financial impact, serving more customers and maximizing the use of an existing fleet.
- Technology to book and track rides benefits not only the customer, in allowing for greater flexibility and ease of use, but also the agency by providing route information which can identify frequently travelled routes and may inform decisions on routes to implement as fixed with key service areas to target for on-demand to/from hubs.

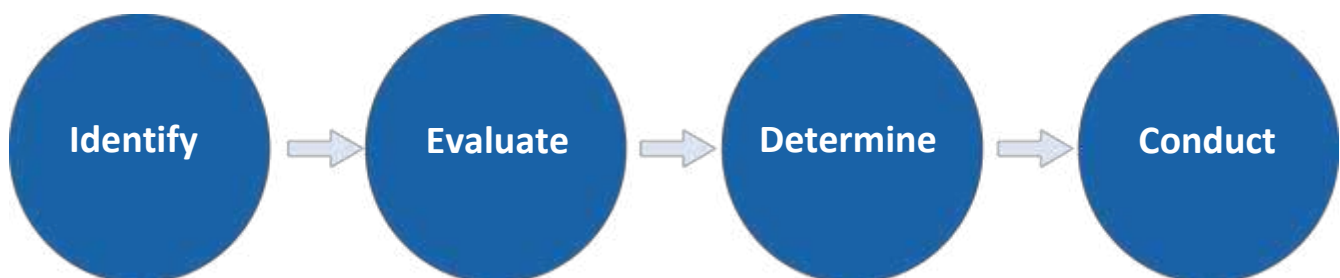
GAP ANALYSIS METHODOLOGY

After identifying best practices among our case studies, we reviewed the current state of HandyDART's services and policies. We then compared HandyDART to case studies that we identified as exemplifying best practices. In some cases, we showcase more than one case study for an evaluation criterion to provide TransLink and Coast Mountain Bus Company with different options to enhance their paratransit service delivery that will fit with TransLink's unique needs, priorities, and focus.

TransLink and HandyDART Board and performance reports guided our understanding of HandyDART services, policies, achievements, and service enhancement priorities. TransLink's 2017 Custom Transit Service Delivery Review (CTSDR) offered insight into shortcomings, key target areas, and opportunities to enhance HandyDART service delivery. The HandyDART Service Performance Review (2019) provided a greater understanding of service operations.

PROCEDURE

1. Identify best practices among our case studies, reviewing literature, organizational reports, and insight from industry mentors.
2. Evaluate TransLink's HandyDART service through each criterion metric.
3. Determine current state of HandyDART.
4. Conduct gap analysis between HandyDART's current services and those of case studies identified as examples of best practices.



COMPARATIVE GAP ANALYSIS & BEST PRACTICE REVIEW FINDINGS

Table 10. Comparison of HandyDart current state with best practices and case study examples.

HandyDART: Current State	Best Practices	Case Study Exemplar	Gap
User Experience: Registration Process			
A basic form must be given to a health professional and signed, indicating that a customer requires paratransit services.	<p>Customers should register with an in-person assessment</p> <p>Minimize necessary paperwork while providing enough background information on the customer</p> <p>Registration should be done within 14-21 days</p>	<p>RideKC Freedom (KCATA) & Mainstream On-Demand (COTA): Requires in-person interview and functional assessment</p>	TransLink does not offer in-person evaluations.
User Experience: Service Eligibility			
<p>A person who has a "temporary or permanent, physical or cognitive disability that is sufficiently severe that they are unable, without assistance, to use conventional transit."</p> <p>TransLink/CMBC Does not currently have a dedicated eligibility assessment centre.</p>	<p>Offer in-person eligibility assessment</p> <p>Offer conditional eligibility to some customers</p>	<p>MOR (YRT): Has a dedicated training and eligibility centre to physically assess how customers can navigate conventional transit; Three types of eligibility: unconditional, temporary, conditional</p> <p>KCATA's paratransit service: Has conditional eligibility</p>	TransLink is missing dedicated eligibility assessment to facilitate conditional eligibility for service.
User Experience: Ride Booking Requests			
Booking only available by phone.	Booking must be available over the phone	Mobility Services (Guelph Transit): By phone, app, and online	TransLink does not have an app or online capabilities for booking rides.

HandyDART: Current State	Best Practices	Case Study Exemplar	Gap
	<p>Booking requests can be made either with a smartphone app or online web portal</p> <p>Customer choice of multiple providers</p>	<p>CARE On-Demand (GRTC): By phone or TNC providers available for booking rides by app</p> <p>HRT Paratransit (HRT): Booking available by phone or online/through a mobile app, but all options only available during call centre hours</p>	
User Experience: Payment Method			
<p>Fares can be paid in cash, FareSaver tickets, or with a monthly pass.</p> <p>TransLink has Compass card, but this is not available to HandyDART customers.</p>	<p>Payment methods include as many options as possible, including cash, credit card, debit card, token, transit card, through an app</p>	<p>MOR (YRT): Can pay by cash, transit card, monthly pass, or payment app; Note: payment app is not integrated with the app to book a ride</p> <p>RideKC Freedom On-Demand (KCTA): Pay through the app or with cash, credit, or debit</p>	<p>TransLink currently has plans to integrate Compass card payment for HandyDART, otherwise accepts only cash, FareSaver tickets and monthly pass.</p>
Customer Satisfaction: Operator & User Training			
<p>Trained drivers operate HandyDART vehicles.</p> <p>Taxi contractors may not be as consistently service-oriented as HandyDART staff.</p> <p>HandyDART provides training and online video sessions on how</p>	<p>Appropriate training for operators</p> <p>Clear, accessible system information</p> <p>Travel training program with information on how to use the service and hands-on vehicle practice.</p>	<p>MOR (YRT): Travel training program consists of train-the-trainer presentations, individual travel training, and transit overview presentations for community organizations</p>	<p>TransLink does not have standardized training for third party operators.</p> <p>The TravelSmart program focuses on education and community outreach; however, it does not offer in-person Travel Training programs.</p>

HandyDART: Current State	Best Practices	Case Study Exemplar	Gap
<p>to use vehicles with mobility devices.</p>		<p>Mobility Services (Guelph Transit): Information available online; Training and practice on paratransit vehicles</p> <p>CARE On-Demand (GRTC): GRTC staff accompany customers on trips to acquaint them with conventional network</p> <p>Mainstream On-Demand (COTA): Sensitivity and first aid training for taxi drivers</p> <p>Ride Freedom On-Demand (KCATA): The call centre explains how to use the app</p>	
Customer Satisfaction: Trip Coordination			
<p>There is little coordination between HandyDART and the broader system, few trips by HandyDART customers are multimodal.</p> <p>Multimodal trips can be coordinated at the time of booking; however, it is not prominently offered.</p>	<p>The entire trip, including the on-demand portion, can be planned in one place</p> <p>Paratransit and conventional vehicles/services can be used on the same trip</p> <p>Dual usage of fleet vehicles</p>	<p>MOR (YRT): Efficient use of fleet; Entire ride planned in one place; Can travel across municipalities</p> <p>GoLink (DART): Users coordinate entire trip with on-demand and fixed route service</p>	<p>Few of HandyDART's trips are multimodal. Paratransit and fixed-route services are not integrated.</p>

HandyDART: Current State	Best Practices	Case Study Exemplar	Gap
	Technology is used for efficient routing, scheduling, and dispatching		
Customer Satisfaction: Instantaneous Ride Booking			
<p>Booking is made through a call centre, 8:00 a.m. to 6:00 p.m. weekdays or 8:30 a.m. to 4:30 p.m. weekends.</p> <p>Trips can be booked from one week in advance to one day before.</p>	<p>Same day booking</p> <p>Online and app-based booking is available 24/7</p>	<p>RideKC Freedom On-Demand (KCATA) & Mobility On-Demand (PSTA): Can book instantaneously by phone or through an app</p> <p>Mobility Services (Guelph Transit): Requires 3 hours advanced notice using conventional paratransit fleet</p>	<p>HandyDART requires users to book by 4:00 p.m. the day before a trip.</p>
Customer Satisfaction: Real-Time Information			
<p>Customers are not told in advance if their ride will be delivered by a HandyDART vehicle or a taxi.</p> <p>Calls are done 10 minutes before the vehicle arrives.</p>	<p>Real-time information is available through an app or web portal</p> <p>Real-time information includes vehicle location, type of vehicle OR name of driver, and ETA</p>	<p>HRT Paratransit (HRT): Customers have access to real-time information on vehicle location, license plate number, ETA, trip route, and current location during trip; Interactive voice response is available</p> <p>Mobility Services (Guelph Transit) & CARE On-Demand (GRTC): Drivers can communicate any delays or issues to customers through the app</p>	<p>HandyDART customers do not know what type of vehicle will arrive and cannot track its arrival.</p>

HandyDART: Current State	Best Practices	Case Study Exemplar	Gap
Customer Satisfaction: Accessible Design			
HandyDART's fleet is a mix of agency owned accessible minibuses, contracted accessible taxis, and standard taxis.	<p>Sufficient accessible fleet capacity for riders who request/need</p> <p>Fleet can accommodate other needs, requests, or aids</p> <p>Universal design for accessibility with conventional vehicles</p>	<p>MOR (YRT): Maintains a fleet that can accommodate other travel needs/requests/aids such as scooters, service animals, and child seating.</p>	<p>Conventional accessible vehicles contribute to a Family of Services integration.</p> <p>Due to a reliance on supplementary taxi services, HandyDART's paratransit fleet of 349 vehicles is not large enough to accommodate all paratransit rides.</p>
Service Performance: Reducing Trip Denial Rates			
0.08% trip denial	Not applicable	Not applicable	Not applicable
Service Performance: Improving Punctuality			
87% of vehicles arrive within 15 minutes before or after the scheduled pick-up time.	<p>Improve driver punctuality by reducing the pick-up window to 20 minutes</p> <p>On-time performance of 95%+</p>	<p>Mobility Services (Guelph): 20-minute pick-up window</p> <p>HRT Paratransit (HRT): 97-100% on-time performance</p>	<p>There is a 30-minute window to wait for the vehicle.</p> <p>Current on-time performance is 87%.</p>
Ridership Scalability: Accommodating Ridership Changes			
Growth was higher than budgeted, so the agency cannot handle riders. For the second year in a row, prior to the COVID-19 pandemic, ridership increased by more than 5%.	<p>Fleet consists of a mix of vehicle types and is used for more than one type of service</p> <p>A suite of connected services accommodates different customer needs</p>	<p>MOR (YRT): Integrated fleet and vehicle types across services</p> <p>Mobility On-Demand (PSTA): Multiple on-demand services to target customers</p>	<p>TransLink only has minibuses and supplementary taxis.</p> <p>Existing service levels struggle to accommodate demand.</p>

HandyDART: Current State	Best Practices	Case Study Exemplar	Gap
Ridership Scalability: Service Scalability			
<p>HandyDART serves over 5,000 people every day across the Metro Vancouver Region.</p>	<p>Have on-demand for paratransit users in addition to traditional service delivery</p> <p>Have a variety of staff, both in-house and contracted third party providers</p> <p>Scalable service with demonstrated ability to expand geographically</p>	<p>CARE On-Demand (GRTC), Mobility On-Demand (PSTA), Mainstream On-Demand (COTA), RideKC Freedom On-Demand (KCATA): TNCs deliver trips in non-accessible vehicles when appropriate, to respond to changes in demand</p> <p>RideKC Freedom On-Demand (KCATA), MOR (YRT): On-demand services to be implemented on a rolling basis to cover more geographies as the service matures</p> <p>Mobility On-Demand (PSTA), CARE On-Demand (GRTC): Ridesharing allows for dynamic fleet capacity; Agency bears little cost/responsibility if service expands</p>	<p>HandyDART does not have an on-demand service.</p> <p>HandyDART’s current service delivery model is restricted to a single fixed-fleet private operator and supplementary taxi service that limits the ease of scalability in real-time.</p> <p>Service can only scale by hiring new drivers and expanding fleet.</p>

HandyDART: Current State	Best Practices	Case Study Exemplar	Gap
Financial Impacts: Trip Costs			
<p>The service cost in 2019 was \$54 million, and had had an average trip cost of \$39.26</p>	<p>The Agency caps the total cost that a transit agency pays up to a certain distance (miles) travelled</p> <p>Transit agency reduces costs when moving from conventional paratransit to on-demand paratransit</p>	<p>CARE On-Demand (GRTC), Mobility On-Demand (PSTA): Agency placed caps on cost per trip</p> <p>RideKC Freedom On-Demand (KCATA): Reduced costs by diverting paratransit to on-demand</p>	<p>The nature of costs to agencies is subjective based on their current transit system, demographics, geography, etc. There is insufficient data to state a gap effectively. However, capping costs and moving conditional eligibility riders on to other appropriate transit methods would help reduce costs and add more dedicated trips for unconditionally eligible riders.</p>
Financial Impacts: Fare Subsidies			
<p>\$3 per trip in cash, monthly pass, \$2.40 through FareSaver tickets for a fixed cost ride. Subtract from the average trip cost of \$39.26, and TransLink subsidizes over 90% of each trip.</p>	<p>Instituting fare by distance shifts some cost to the customer and limits transit agency exposure</p> <p>The transit agency subsidizes part of the customer's trip cost</p>	<p>Mainstream On-Demand (COTA), RideKC Freedom On-Demand (KCATA): Both services charge distance-based fares</p> <p>Direct Connect (PSTA): PSTA's FMLM program called 'Direct Connect' caps the amount of fare subsidized by the agency rather than capping the fare paid by the customer</p>	<p>TransLink charges a flat, one-zone fare for trips.</p>

ANALYSIS

Registration Process

For the registration process, a best practice is conducting an in-person interview with the customer. An in-person assessment allows for a respectful dialogue between the customer and the agency while treating and assessing all customers equally (CUTA, 2013, p. 9). This provides the agency with the most accurate picture of a customer's individual ability to navigate the transit system and minimizes the amount of paperwork required, potentially shortening the application process (CUTA, 2013, pg. 8). Based on standards in several jurisdictions, the registration process should take no more than 14 days. This is also the standard in Ontario's Accessibility for Ontarians with Disabilities Act (AODA) (Thompson, 2019). Fourteen days improves upon the mandated 21 or 45 days in the United States and Quebec, respectively (CUTA, 2013, p. 7). The registration process should be handled in-house to provide a first point of contact between the agency and the customer to establish a relationship and accountability (CTSDR, 2017, pg. 7). Kansas City Area Transportation Authority's RideKC Freedom On-Demand and Central Ohio Transit Authority's paratransit services both require in-person assessments.

The Gap:

Currently, HandyDART registration consists of the customer filling out a standardized form, indicating they require paratransit service and assessing their ability to navigate the conventional transit system (TransLink, n.d.b). HandyDART offers no in-person assessment, which presents the most significant gap between the current and end states. TransLink processes HandyDART applications within 10 days of receipt (TransLink, 2020).

Service Eligibility

In-person assessment treats everyone equally and allows for open dialogue between the applicant and the transit agency. Conditional eligibility allows for a nuanced assessment of individual needs and the best matching of vehicles and services to meet their needs under different circumstances. This helps deliver a uniquely tailored transit experience to customers, allowing them to navigate the conventional transit system and take advantage of more services. Eligibility should be based on TransLink's current standard of a person having a "temporary or permanent, physical or cognitive disability that is sufficiently severe that they are unable, without assistance, to use conventional transit" (TransLink, 2013, p. 4). York Region Transit (YRT) operates an eligibility centre complete with a mock bus overseen by an occupational therapist to assess how a customer uses conventional transit, including getting to a transit stop, and embarking and disembarking from a vehicle. The RideKC Freedom On-Demand service has a policy of determining conditional eligibility for paratransit service based

on imaginative factors such as how the weather is and how far away a user will be from a conventional transit stop, for example (RideKC Freedom, n.d.).

The Gap:

HandyDART's current policy is to ascertain whether an individual can use the standard transit system using forms and signing of a medical authority, who may not know the full extent of the conventional transit system's accessibility. They qualify for door-to-door paratransit service through HandyDART if they are unable to use the conventional transit system. There is no in-person assessment as part of this process with no dedicated assessment centre. Instituting a policy of determining conditional eligibility, as well as establishing an assessment centre to do so, fills the gap found between TransLink and the best practices.

Ride Booking Requests

There has been near universal agreement within literature and inside the industry that an option to book over the phone is necessary. This is to ensure an accessible option for those who are unable to use the internet or smartphones. Beyond this necessity, expanding booking options to include an online web portal and smartphone app provides greater convenience, flexibility, and utility to customers who wish to use them. Added technology can overcome the limitations of a phone line, which is often only open during the day. Guelph's ride-booking suite of options is robust, offering customers the ability to book over the phone, online, and via an app – the latter of which can be done 24/7 (City of Guelph, 2020a). Similarly, Hampton Roads Transit (HRT) allows for online and app booking with limited call centre booking hours (Hampton Road Transit, n.d.). Another potential improvement is offering customers multiple service delivery options with multiple contracts, as in Greater Richmond Transit Company (GRTC)'s CARE On-Demand (GRTC, n.d.). This allows users to pick their preferred provider and encourage performance through competition or pick service features they value, such as requesting a favourite driver.

The Gap:

Guelph's functionality contrasts with TransLink, which offers only a phone line for paratransit booking and lacks digital alternatives. Creating a digital infrastructure that can allow customers to book requests at their leisure would bridge the gap present, offering customers an app or website with which they can input their own bookings. Another approach is developing an API as part of this infrastructure that allows other services to integrate into the HandyDART ride-booking landscape. TransLink's Custom Service Transit Delivery Report (2017) also recommends an option for customers to book online.

Payment Methods

The evaluation criterion aims at providing customers with the most flexible and convenient methods of paying for their rides. Industry practices highlight several payment options, including cash, credit card, debit card, tokens, transit cards, through an app, through digital services such as Apple and Google Pay, or ⁶⁸via cash. As such, incorporating as many of

these methods as is feasible would be the best practice, to better meet customers' needs. Customers should have the ability to pay by cash, so that unbanked customers have access to the transit system (Curtis et al., 2019). However, farecards, which can be recharged using cash, is an alternative method of meeting their needs. Among our case studies, RideKC uses existing payment infrastructure in their taxi vehicles, offering customers the ability to pay through their app, credit or debit, or via cash (RideKC, n.d.). Alternatively, York Region uses the same payment methods on both conventional and on-demand paratransit (York Region Transit, 2020).

The Gap:

Presently TransLink is working on integrating their Compass Card into their payment structure. However, HandyDART's current payment methods are only cash, FareSaver tickets, or monthly pass (TransLink, 2020). While implementing Compass Card functionality will add to customers' options, other charge or credit card options, as well as digital payment methods, will significantly bridge the gap between TransLink and the observed best practices. Combining payment options with a HandyDART app would add for overall functionality and user convenience.

Operator and User Training

The paratransit system should offer robust training to paratransit customers to enable them to be confident when navigating not only the paratransit system, but also the larger transit network including fixed-route services. Providing customers with clear and accessible information empowers them to learn how to ride paratransit and the conventional transit system confidently. This can include providing users with an information package detailing the service and its use. Travel training programs enable customers to practice embarking and disembarking from different types of vehicles and also practice navigating the larger transit network (Beyerle, 2017).

The other aspect of this evaluation criterion is the consistent training of operators. This means having all operators trained on the needs of paratransit users in order to best serve them, whether operators are contracted out or not. Regardless of which vehicle and operator, the same high-quality of service ought to be offered across the system. Demonstrating both principles, Guelph Transit offers customers an information package upon registration approval, as well as travel training to assist persons with a disability on how to use conventional transit by practicing on a vehicle (City of Guelph, 2020b). York Region Transit also offers a travel training program, which consists of "train-the-trainer" presentations, individual travel training, and transit overview presentations for community organizations (York Region Transit, n.d.). Another travel training program to highlight is that of the GRTC which allows customers to travel on conventional bus trips with a trainer (GRTC, 2019). To help overcome technological barriers among seniors and individuals with disabilities in operating implemented software technologies, RideKC offers a call centre function that guides users through using their booking app. HRT Paratransit provides videos on different aspects of

using their app, including on how to log in for the first time. For operator training, the COTA ensures that the TNC drivers they contract are all equipped with ADA sensitivity training as well as first aid training, and the operators and vehicles are clearly identified to users with uniforms and branding (Columbus Advisory Committee on Disability Issues, 2019; UZURV, n.d).

The Gap:

TransLink offers a TravelSmart program that conducts education initiatives and community outreach teaching people how to access their various fleet options. However, the program does not include in-person travel training. The CMBC also provides training on how to board and disembark from a bus with a mobility device (TransLink, n.d.a), and there exists a virtual bus tour to better acquaint customers with TransLink's accessible traditional transit vehicles (Autism BC, 2020). There is online documentation and accessible videos to introduce riders to the traditional transit system (TransLink, n.d.a), and HandyDART itself (TransLink, n.d.b). TransLink employs many of the best practices found in this report regarding user training, however a slight gap exists with respect to consistent operator training whereby third-party drivers do not necessarily meet the high standards of the HandyDART drivers themselves (TransLink, 2017).

Trip Coordination

In order to efficiently implement a Family of Services approach to transit, paratransit vehicles and conventional transit vehicles should be used together in the same trip according to industry consultation, allowing some paratransit users to make use of the accessible conventional transit system while reducing the reliance on HandyDART as the sole transit method for all paratransit journeys. To facilitate this, a user's entire trip should be able to be planned in one place to clearly inform customers which modes of public transit they would take, integrating all transportation options they are capable of utilizing (Weinreich et al., 2020). Logistically, the TransLink fleet should look for dual usage opportunities for its vehicles, potentially using conventional transit vehicles for paratransit uses or using paratransit vehicles to service the broader transit system, increasing fleet capacity and flexibility. Integrating a scheduling software that allows for this kind of coordination would further improve efficiency by reducing staff resources dedicated to scheduling rides (RideCo, n.d.). Additionally, YRT's Mobility On-Request allows for multimodal trip planning through its app (York Region Transit, 2019b).

The Gap:

Less than 1% of HandyDART trips use multiple modes of transit (TransLink, 2020, p.6) indicating a siloing of service between it and conventional transit. There is little incentive for customers to use the service as anything other than a trip from point A directly to point B, nor is there adequate information and trip planning to do otherwise. Similarly, there is a separation between the HandyDART fleet and CMBC fleet in terms of operation preventing dual usage of vehicles. Retooling how TransLink views the two services and putting forth a

Family of Services model that looks to use all components of the transit system in the most efficient way to deliver service would work towards addressing the gap between TransLink and the best practices. Building on this to offer customers integrated multimodal trip planning works to further bridge the gap.

Instantaneous Ride Booking

Best practices for this evaluation criterion are dependent upon what type of service is being offered to customers. Transit agencies that integrate ridesharing services into their transit delivery are often able to offer instantaneous ride booking in the same efficiency as standard ridesharing companies. This can be seen in the Pinellas Suncoast Transit Authority (PSTA) via its partnership with Lyft through the Mobility On Demand program (RidePSTA, 2019) or In Kansas City with RideKC Freedom On-Demand and their partnership with a taxi TNC (Hartle, 2017). Guelph Transit requires only 3 hours advanced notice, a change from the 24 hours' notice they required before (City of Guelph, 2020a). This was achieved through superior booking technology while still using traditional paratransit vehicles and service (RideCo, n.d.). Furthermore, providing customers with more options to book via app or online may expedite the booking process itself, allowing the customer to book on their own time at their convenience rather than exclusively going through a call centre.

The Gap:

Trips over HandyDART can be scheduled one week to one day in advance of the departure date. Trips must be booked before 4:00 p.m. the day before, and the call centre operates only from 8:00 a.m. to 6:00 p.m. on weekdays, 8:30 a.m. to 4:30 p.m. on weekends. Providing customers with a method to book trips 24/7 via app or online will allow for TransLink to have more convenient booking and eliminates the 3 minutes customers spend on hold waiting to book over the phone (TransLink, 2020). Enabling more rapid and flexible fleet scheduling would greatly improve the service to customers who can not always plan their trips so far in advance such as the 3-hour advanced booking seen in Guelph.

Real-Time Information

Providing customers with up-to-date information on the status of their transportation improves customers' quality of life and ease of using the service by revealing when exactly a vehicle will arrive to pick up the customer. Real-time information accessed with an app or over the internet allows for this convenience (Simaiakis, 2020). Real-time information such as the whereabouts of a pick-up vehicle, type of vehicle arriving, who the driver is, and the estimated time of arrival provide customers with confidence before a trip and offers assurance that they are getting into the correct vehicle. HRT Paratransit incorporates vehicle tracking in their app demonstrating the best practice in action (Hampton Roads Transit, n.d.a). A feature seen in GRTC's CARE On-Demand is the ability for the driver of the vehicle to contact

the customer to communicate delays or help locate the vehicle at the meeting point through ridesharing technologies.

The Gap:

TransLink employs a system of customer notification that calls the user's listed number 10 minutes before the vehicle is due to arrive (TransLink, n.d.b). Addressing the gap between this and the best practices would consist of implementing an accessible digital framework where customers can view more precise information, displaying the estimated time of arrival, location of the vehicle, and potentially the driver operating it. Additionally, it would be encouraged to offer telephone notification services for those who are not able to access the internet or a smartphone to get this information.

Accessible Design

Important to delivering service is having an enough accessible vehicles able to provide service to those who need it. This can include the number of vehicles in a fleet, the more efficient use of those vehicles, or supplementing capacity through a third-party provider. Additionally, industry leaders point out that not only riders but personal support workers, mobility devices, service animals and potentially other travelers including children should be accommodated if possible. Beyond the paratransit vehicles themselves, the conventional transit system should be made universally accessible enabling more riders of varying ability to utilize it. This benefits not only the riders who are given more agency in their transit choices but is necessary for a Family of Services approach to transit. As part of its paratransit, YRT seeks to accommodate customers who require aids and assistance, giving them the option of selecting if they use a mobility device or are travelling with companions in order to accommodate each journey (York Region Transit, 2020).

The Gap:

TransLink's fleet of buses and other transit modes such as the SkyTrain and Canada Line, SeaBus, and West Coast Express trains are all accessible to users of all abilities (City of Vancouver, 2020). With respect to the HandyDART fleet, it is likely that the planned growth of paratransit vehicles through the 10-Year Vision will not keep up with the growth in use of the service and more third-party taxis will be required to address this. Either reducing reliance on paratransit vehicles through a Family of Services model or procuring more capacity by contracting services or expanding the HandyDART fleet more than planned may be necessary.

Trip Denial

There has been insufficient data amongst studied jurisdictions. As such, the research team is unable to develop a set of best practices related to reducing trip denial.

Improving Punctuality

An assessment of practices on customer pick-up revealed that many transit agencies use a 30-minute pick-up window around their scheduled paratransit pick-up times, although some agencies are able to achieve lower times. Guelph states a 20-minute window is their target window, indicating a best practice that TransLink can replicate (City of Guelph, 2020c). Regarding the observed performance of service delivery, HRT Paratransit claims to have achieved a nearly 100% on-time performance (Hampton Roads Transit, n.d.b.). HRT has set a goal of over 95% on-time performance for their paratransit service, which is another best practice to aspire towards (Hampton Roads Transit, 2020). Improving on these metrics gives customers a higher level of satisfaction by reducing the amount of time they must dedicate to waiting. YRT has contracted multiple contractors in an effort to improve punctuality York Region Transit. 2019b).

The Gap:

Currently TransLink operates under a 30-minute pick-up window and maintains an 87% on-time performance (TransLink, 2020). The case studies had better metrics through implementation of on-demand service with private contractors and improved route software which are other avenues TransLink can explore to improve their performance in this criterion. Additionally, adding contractors will help supplement HandyDART's 349 vehicles thereby increasing delivery and punctuality of service. This can add to costs with respect to contract management (TransLink, 2017), however it allows contractors to receive more or less work based on their own performances creating an incentive to deliver high quality service to customers (TransLink, 2017).

Accommodating Ridership Changes

In order to meet potential ridership increases industry leaders promoted the idea of flexible fleet usage by expanding vehicle use over more than one transportation service, integrating HandyDART and conventional bus fleets. Industry leaders indicated that this opens more options for scheduling and fleet usage during peak and off-peak hours, and can accommodate different levels of ridership in the system using varying fleet vehicle sizes and types in an integrated service that responds to customers' needs. YRT uses the same combined fleet of vehicles for both their MOR and MORP programs with different TNCs working together to provide the service, able to meet a 155% increase in service over 2 years (York Region Transit, 2019). Similarly, PSTA offers multiple on-demand services to target customers and meet demand (Pinellas Suncoast Transit Authority, 2020).

The Gap:

HandyDART ridership continues to increase at a rate above 5% (TransLink, 2020, p.41), outstripping the planned expansion of the service in the 10-year plan. There is also a division between paratransit services and conventional transit that allows only HandyDART minibuses

and supplementary taxis to service paratransit needs. A reimagining of the roles and responsibilities of the fleet and how they can best meet the demands of transit riders would help to allow the system to expand to accommodate ridership changes. Adding to this idea is contracting an appropriate TNC to meet excess demand in a way that preserves user experience through maintaining the high standards of HandyDART service delivery.

Service Scalability

Service Scalability can be broken into asset and labour sub-categories. Assets refer to vehicles used to provide transit service. In the case of HandyDART, this is minibuses supplemented with taxi vehicles. The labour component refers to the number of operators who can provide accessible high-quality service. Having a variety of staff both in-house and contracted provides a staff large enough and flexible enough to meet demand. Transit authorities have approached this criterion differently, with RideKC, GRTC, PSTA, and Central Ohio Transit Authority (COTA) contracting TNCs to provide both assets and labour to scale their service as needed. Particularly, PSTA and GRTC leverage partnerships with Uber and Lyft (GRTC, 2017; Shared Use Mobility Centre, n.d.). If more service is needed more operators are brought into the system in the same way rideshare companies adjust to demand – at least in the case of some service. If demand decreases, there are no negative consequences to the agencies in having excess staff and vehicles. This is particularly useful to scale up the service area of a program as implemented by YRT and RideKC, who expanded their service gradually as they introduced their programs (RideKC, 2018).

The Gap:

If HandyDART needs to expand its in-house fleet it must acquire new stock of buses and train operators which is costly and slow, and creates an inelastic supply of transit. If service cannot meet demand taxis are contracted to fill the gap, however implementing a more on-demand focused system would allow for greater scalability as the service expands or contracts offering both potential cost savings and increased customer responsiveness for the nearly 5,000 customers who make use of HandyDART across the Metro Vancouver area daily – a figure set to increase into the future. If TransLink opts to begin a new program of on-demand to compliment existing services rolling it out over smaller areas gradually has also found to be beneficial.

Trip Costs

The analysis of the trip cost to agencies is more nuanced than finding a best practice, as many different types of fare and service delivery exist, each within the context of a jurisdiction's particular operating model and the demographic and geography served. In general, the transit agencies studied found cost savings when they promoted an on-demand supplementary service that shifted customers away from solely relying on traditional paratransit. This was due to the relatively higher costs of each traditional paratransit trip

compared to the lower costs of on-demand vehicles and labour. Another way to reduce operating costs while still maximizing types of service offered to the customer is to limit the amount agencies pay over distance, though this applies only to programs that incorporate distance-based fares. GRTC managed to reduce costs to their transit agency by instituting a cap on the amount they will pay for an individual ride (Shared-Use Mobility Center, 2017).

The Gap:

As TransLink has only HandyDART to service paratransit trips, it is not possible for them to promote a complementary program that is less expensive to shift use. Alternatively putting a cap of some sort on the total cost of the trip paid by TransLink would control costs and make them more predictable.

Fare Subsidies

Fare subsidies refer to how much a transit agency pays for a trip; minus the fare they receive. This is linked to trip costs to agencies but is more about how much of a particular trip is borne by the agency relative to the customer. Every transit agency subsidized the fares of their paratransit users to varying degrees. As mentioned in the "Trip Cost to Agencies" section, the most effective way to limit costs was shifting a proportion of the cost onto the customer by accounting for the distance of the trip taken as in the programs of RideKC and COTA (RideKC, n.d.b.; COTA, 2019). An alternative is to simply increase fares to limit program costs (The Kansas City Star Editorial Board, 2018). Structuring a fare subsidy to provide a capped, flat rate subsidy as in the case of the PSTA and their Direct Connect program is another way to control spending (Pinellas Suncoast Transit Authority, 2020).

The Gap:

Currently TransLink's flat fare allows for unlimited travel door-to-door without an ability to control for costs. This leads to an average cost per trip of \$39.26 for the agency and between \$3 and \$2.40 in fare to cover it and agency subsidizing over 90% of the ride (TransLink, 2020, p.46). To cover this gap altering the fare structure to one that is distance based in some fashion would be beneficial in saving costs.



Section E:

Recommendations & Next Steps

INTRODUCTION

Having identified via a gap analysis the areas for which TransLink should prioritize improvements, we were able to construct the following set of policy recommendations that, if implemented, would yield the outcomes described in the research objectives and would result in an improvement across every metric within our evaluation criteria.

POLICY RECOMMENDATIONS

1. TRANSLINK TO IMPLEMENT TECHNOLOGIES THAT ENHANCE ROUTING AND OFFER INSTANTANEOUS BOOKING

For the Customer: Improves flexibility and ease of use. Allows users to book in real time, receive accurate and up to date information, and offers a selection of payment options through an app or internet web portal.

Improves the following criteria: Ride Booking Requests, Instantaneous Ride Booking, Real-Time Information

For the Agency: Allows adjustment of fleet and drivers to meet fluctuating demand; in the long run, will reduce scheduling time currently required by staff; can increase ridership

Improves the following criteria: Trip Coordination, Improving Punctuality, Accommodating Ridership Changes, Reducing Trip Cost to Agency, could help coordinate fare subsidies for different types of trips.

Developing or adopting some form of app-based technology for booking rides provides customers the flexibility to book trips as they need them, track rides in real-time, and provide a range of payment options including credit card, apps, or cash-loading media (FTA, 2020).

The app would not only provide users with valuable information, but it would track and record ridership information which the agency could use to evaluate performance and inform future decisions (PSTA, 2018).

The app should incorporate the rider's accessibility needs and abilities to offer a customized trip route to provide the best travel option for the user, and the most efficient delivery option by the provider. In other words, the app will provide on-demand paratransit as

needed, and when it is appropriate, the app will also connect paratransit to conventional transit modes (York Region Transit, 2020).

For example, if a customer is able to take a bus, but is unable to get to the station—a first mile/last mile barrier—then the app would offer to provide an on-demand ride that picks up the customer and drops them off at the bus station, and then another ride from the final stop to the rider’s final destination.

Customized and automated travel plans not only make trip planning streamlined and easy for customers to navigate, but it also encourages commingling, promotes inter-modality, provides connectivity between the otherwise isolated paratransit and conventional transit systems, and ultimately supports the Family of Service model TransLink wishes to embody (TransLink, 2017).

In developing this service, conditionally eligible customers can access public transit in a way that best suits their abilities, while increasing the available supply of paratransit trips for unconditionally eligible customers. App- based technologies can also provide additional assistance functions such as interactive voice responsiveness, as is the case with the HRT Paratransit app powered by Via (HRT, 2020).

Internet browser-based booking should also be made available, and can be synchronous with the app. These digital booking options should be offered as additional options for customers and should not be seen as a replacement of the existing method of booking over the phone.

Lastly, an app would be a compounding investment in both paratransit and conventional transit alike. A digital platform would allow paratransit and conventional transit to exist simultaneously, connecting to one another, and offer new travel solutions to all riders, regardless of which system or mode they choose. As DART’s GoPass demonstrated, an investment in transit does not need to be exclusively paratransit-focused to result in benefits to people with disabilities or improvements to the paratransit system (FTA, 2020).



2. HANDYDART TO REVISE ELIGIBILITY ASSESSMENT PROCESS

For the Customer: Meets unique needs, customers have more voice in the process

Improves the following criteria: Registration Process, Service Eligibility, Operator and User Training, Trip Costs

For the Agency: Properly matches specialized vehicles and services to needs of riders, whereas previously riders may have been improperly matched with services they did not need, or could have benefited from simple accommodations that would have enabled use of conventional transit.

Improves the following criteria: Trip Costs, if it better assesses/discourages/denies people who are not in need of more the more costly dedicated paratransit rides or could have a better ride experience using conventional transit with minor accommodations. Accommodates new ridership demand within the existing specialized fleet, by shifting trip to other vehicles.

Striking a balance between an application process that is comprehensive, accurate, and takes into consideration the unique needs and abilities of each rider, all while not becoming onerous, inaccessible, time consuming, or slow to process and approve, is no easy feat. However, some concessions are needed during the upfront application process to ensure applicants are provided with the services and accommodations that meet their level of ability and comfort. Specifically, a more nuanced evaluation and assessment process is necessary to give the agency the level of detail necessary to properly serve its paratransit ridership (RideKC, 2019).

As such, an in-person interview is imperative to properly understand each paratransit user's unique circumstance and allows the agency to properly curate a plan that empowers riders to use conventional transit where and when they can, while providing the appropriate paratransit services based on the needs of each individual rider. For example, the assessment should appropriately match riders with the correct vehicle type or certain accommodations during specific times of the year or weather conditions (RideKC, 2019).

It was recommended by industry mentors that a dedicated assessment centre or station(s) be created for these in-person eligibility assessments to be conducted. By doing so, resources can be managed efficiently, and the application process can be optimized to minimize delays for people receiving services that they depend on. Accommodations should be considered for people who may find this change in-and-of itself inhibitive to accessing needed paratransit services. Further, the assessment centre should allow customers to test mock-ups of vehicles in order to understand and assess their comfort and abilities jointly with the agency.

In addition, a timeframe should standardize processing times, with a cap put on how long an applicant can be expected to wait for their application to be processed. HandyDART should continue to aim for its current 10-day turnaround time. In doing so, the agency can build credibility by proudly holding itself to a high standard of excellence, while giving applicants assurance that they will hear back within a reasonable window of time (Bjerkan & Øvstedal, 2020).

Lastly, the application process should include the option for conditional eligibility, creating a more nuanced, flexible, and adaptive model of service delivery, providing an optimized experience for the customer, and the most efficient delivery of necessary services by the agency (RideKC, 2019).

3. TRANSLINK TO DEVELOP TRAINING REQUIREMENTS FOR ALL PARATRANSIT PROVIDERS AND OPERATORS; OFFER TRAVEL TRAINING FOR TRANSIT USERS; LAUNCH AN AWARENESS CAMPAIGN

For the Customer: Confidence in the use of transit networks, comfort using technology, assurance that each driver has the same level of training no matter their agency employer, and relief from social anxiety associated with using conventional public transit.

Improves the following criteria: Customer Satisfaction, User Experience, and Service Performance.

For the Agency: Uphold high standard of care and service delivery from all drivers and operators, encourage and empower people to shift modes to conventional transit where appropriate, alleviating unnecessary demand on the paratransit system.

Improves the following criteria: Scalability, Accommodating Ridership Changes

Consistent operator training outcomes across operators and robust travel training for paratransit customers is essential to ensure a positive customer experience. Without waiting for provincial Accessibility legislation, TransLink should take proactive action in developing its own accessibility standards and policies.

To ensure a high-quality team of operators and service providers, a standardized training program or set of requirements should be expected of all employees providing paratransit, regardless of whether they are part-time, contracted by a partner TNC, or full-time agency employee, etc. The training should focus on providing appropriate accommodations and excellent customer service to every person, regardless of ability (COTA,

2019). To mitigate any potential influence this requirement may have on dissuading contracted drivers from offering paratransit services, TransLink may wish to consider providing incentives for completing this training.

When transit agencies prioritize consistent data tracking and evaluation of travel training programs, they can enhance the quality of these programs, improving the outcome for paratransit users while also sharing their success with the community which can attract partnerships or additional clients (NADTC, 2019).

Travel training for customers should include support to learning how to use the software booking systems, wayfinding, on/offboarding, appropriate behavior when using transit, and how to read schedules/routes (GRTC, 2017).

Conversely, we have heard from industry mentors that stigma, social anxiety, and fear of embarrassment can be a negative consequence to intermingling for people with disabilities, which is itself a barrier to accessing transit. As such, in addition to empowering people with disabilities with travel training, we also recommend an awareness/anti-stigma campaign to educate the broader public about people with disabilities using conventional transit. This could include greater representation of people with visible disabilities in media and future campaign materials, reminding people that not all disabilities are visible, and bringing to people's attention some of the many accessibility features such as ramps or brail, that stations provide that people may not know about.



4. OPTIMIZE FLEET

For the Customer: more vehicles and drivers to take people with disabilities where they need to go, when they need to get there. Greater selection of choice, improved responsiveness, faster scheduling, and confidence that services standards will not decline during peak times or as demand grows, potential cost savings could be realized.

Improves the following criteria: Customer Satisfaction, User Experience, Service Performance, Financial Impacts.

For the Agency: more efficiency, without the cost of procuring vehicles; better performance measures.

Improves the following criteria: Ridership Scalability, Financial Impacts

The final policy recommendation speaks to fleet management and program scalability. Procuring new vehicles and hiring additional drivers to expand paratransit is expensive, and the rate at which the fleet would need expanding in order to meet the anticipated growth in ridership, would outstrip HandyDART's ability to procure and pay for them. Thus, alternative means of accommodating growing demand is needed (TransLink, 2017).

We recommend that TransLink review the existing fixed-routes with low ridership. TransLink should compare their feasibility against their replacement by on-demand ride sharing alternatives (FTA, 2020).

Further, TransLink should explore potential partnerships with 3rd party TNC's in order to utilize the existing fleet and workforce of these companies to accommodate additional service delivery demands and ridership growth, in lieu of costly investments in additional vehicles and their maintenance, and the additional drivers that would be needed to drive them (RideKC, 2019).

Not only would this option offset the costs associated with program scalability meaning lower costs to agencies, but many of the cases show that these partnerships can directly result in lower fares for riders.

Lastly, the fleet is not the only benefit from these partnerships; the app software of TNC's can be adopted as part of negotiations, further reducing the up-front costs of pilots or risk of implementation that comes with developing new software or a proprietary app/web-based booking system.

ENHANCEMENT MODELS FOR MOVING FORWARD

To provide TransLink with direction on how to integrate and implement the four aforementioned policy recommendations, **three enhancement models** were developed using current best practices identified in our case studies and literature review.

Understanding that TransLink's needs and challenges are unique and complex due to the large geographic area that HandyDART serves, as well as its established identity as a public transit agency, we wanted to offer a multiplicity of choice. As such, we constructed a suite of policy packages that TransLink may wish to choose from. These packages are meant to serve as broad guidelines that promote the cohesive implementation of the stand-alone policy recommendations in a way that best suits TransLink's needs.

The policy packages, or 'enhancement models' encompass a range of benefits, as well as an increasing intensity of interventions required of TransLink to implement each policy. Furthermore, each model would place HandyDART at a different point on the public-private spectrum. Starting with the option requiring the fewest interventions to TransLink's current paratransit operations and resulting in the most public-based service delivery, our **'Improvement'** model limits private contracting and decentralization while offering important changes where they are needed most. An **'Innovation'** model includes a moderate amount of reorganization of HandyDART's service delivery and operational restructuring, including a shift toward increased partnerships with the private sector in efforts to streamline certain aspects of service delivery. Finally, a **'Transformation'** mode approach requires substantial change up-front but may result in significant benefits to both TransLink and its customers.

Through our case studies, the research team found that several agencies have seen success from shifting some parts of service delivery to the private sector. For example, partnering has enabled transit agencies to integrate a suite of trip-booking and routing technology and optimize dynamic fleet adjustment. In some cases, such as for COTA, DART, RideKC, and York Region, these changes have led to geographic service expansion and increases in ridership.



THE ‘IMPROVEMENT’ MODEL

Technologies to Improve User Experience

Booking and routing technologies enable customers to book rides and track their trips in real-time. HRT for example, adopted an on-demand service by implementing real-time booking and tracking through both mobile and web-based portals (Hampton Roads Transit, 2020). Improvements included on-time performance, and ease of use for customers. It also provided accessibility features including interactive voice recognition.

Enhanced Eligibility Assessment to Improve User Experience

Like York Region, TransLink should offer in-person eligibility assessment to better match vehicles to specific customers’ needs (York Region Transit, 2020).

Cost-Saving Fleet Optimization

As of 2017, TransLink has completed a process to optimize the size of their fleet in order to best meet demand. As a step further, HandyDART could explore using specialized and non-specialized vehicles across fixed-route and paratransit services. In doing so, they could optimize revenue hours, respond to peak and off-peak demand more efficiently, and meet more customers’ needs (TransLink, 2017).

Minimizing Impacts on Fares and Subsidies

In this model, HandyDART would not necessarily need to change its fare structure, since optimizing the usage of existing fleet would generate efficiencies and result in a positive financial impact, offsetting costs associated with app development and in-person eligibility processing. Further financial impacts beyond the scope of this research would need to be explored.

THE ‘INNOVATION’ MODEL

Technologies to Improve Customer Satisfaction

Similar to RideKC’s approach, TransLink can enhance customer satisfaction by providing instantaneous booking any time of day, 7 days a week, as trips are needed (RideKC, 2019). This feature would be offered as part of an app-based or web-based booking technology.

Partnering to Meet Increasing Ridership Demand

To respond to shifting demographics and growing demand for paratransit, this model recommends working with a single private fleet provider to allow for immediate scalability. To see an example of how this was done successfully, Kansas City’s RideKC partnered with an existing local taxi fleet allowing it to deliver on-demand ride requests. (RideKC, 2019)

Automatic Trip Planning to Improve Customer Experience

To achieve a Family of Service model, smooth transfers between conventional transit and paratransit is necessary. In order to achieve that, the Innovation model includes

automated, customized trip coordination and efficient routing across both conventional and paratransit service types—all of which would be coordinated through a single simple interface. For example, DART uses an app to coordinate trip routes using preset destination anchors and combining on-demand first-and-last-mile service with fixed-route transit in the same trip (FTA, 2020).

Holistic Service Delivery to Improve User Experience

To help paratransit customers navigate between services, a holistic User Training program combined with newly offered conditional eligibility, customers can travel with confidence having an understanding of their transit network they are using, and knowing their trip has been customized to fit their needs and match their abilities (York Region Transit, 2020).

THE ‘TRANSFORMATION’ MODEL

Multiple Partnerships for a Range of Benefits

In this transformation enhancement model, TransLink would contract multiple private service providers for their on-demand fleet, like GRTC has done. Decentralizing the fleet and operators through multiple partnerships with Transportation Network Companies, such as Uber and Lyft, allow for rapid scalability by using already available and active vehicles and trained operators, thus enabling the transit agency to accommodate changes in ridership (GRTC, 2017). In doing so, HandyDART would also ensure it continues to offer a range of options for paratransit customers. Furthermore, as seen with DART’s subsidy differential between in-house fleet and UberPool trips, significant cost-savings are possible with such partnerships.

Contracted Training Provider for Higher Customer Satisfaction

High-quality training across all drivers and operators, both contracted and agency-employed alike, could be delivered by a private contractor, while TransLink standardizes its contents and retains oversight, as was the case for COTA (COTA, 2019). The desired outcome would be a continuity of service experience for customers regardless of operator.

Fare Restructuring in Response to Financial Impacts

HandyDART would offer fare structures similar to PSTA, where the amount of fare subsidized by the agency is capped per trip, rather than capping the fare paid by the customer. PSTA offers both paratransit and conventional transit services where the fare for the customer is capped, combined with a ‘Direct Connect’ program where up to \$5 for Uber trips and \$25 for WAV/taxi rides are covered by the agency (PSTA, 2018). Applying this to HandyDART, frequent or short routes could be covered with a fixed cost to the customer, while a maximum subsidy cap could be instituted for long distance trips beyond a certain distance or service area.

NEXT STEPS

In this report, we have investigated the feasibility of introducing On-Demand Ride-Sharing to Paratransit. Informed by best practices and a literature review, evaluation criteria were developed and a gap analysis was conducted to help our research team develop a set of actionable and realistic policy recommendations that TransLink should consider adopting if they foresee a future with on-demand paratransit.

In addition to the three policy framework models, this report concludes by outlining a series of next steps that can direct TransLink toward timely, results-oriented milestones to reach throughout the process of adopting our recommendations.

First, this report and its findings should be presented and approved by the Board of Directors. It should be accompanied by motions that if passed, would state the board's commitment to exploring further the feasibility of adopting these recommendations.

Next, a major limitation of the research in this report was that our ability to engage with various groups and stakeholders was beyond the scope of this project. Effort was made by the research team to consult with the HandyDART User Advisory Committee, and multiple industry leaders and professional mentors to help guide our research. However, it would still be encouraged that TransLink conduct additional, more robust consultation and engagement exercises with both paratransit users, and key stakeholders as part of their exploration into the feasibility of adopting these recommendations.

Should TransLink continue moving forward with on-demand paratransit, once these key groups have been consulted, then TransLink should put out a Request for Proposal (RFP) for whichever services they think would be better handled through a Public-Private Partnership (PPP). This RFP could be to bid on a contract to access a TNC's fleet, or a tech-firm to develop new software, or any other customer service provider/operator.

Lastly, prior to the commencement of the next procurement process for a third party HandyDART provider TransLink/CMBC could further explore opportunities to pilot on-demand for paratransit in a specific geographic area to understand user impacts/benefits and effectiveness as a potential service delivery model that could be integrated into future third party contracts.

These next steps and suggested timelines are just that—suggestions. We understand that report recommendations are often easier said than done. However, it was important to the research team that all the recommendations be both reasonable, directly actionable, and achievable in realistic timescales. We strongly believe all the recommendations in this report are within the reach of TransLink, and we hope the agency will take seriously the steps forward and policy recommendations outlined in this report.



Section F:

Lexicon

LEXICON

Americans with Disabilities Act

The Americans with Disabilities Act, 1990 is United States legislation that regulates paratransit.

ADA Paratransit Trip

Any paratransit trip must be within $\frac{3}{4}$ of a mile of the fixed-route transit service and operates on the same hours as fixed-route service. Title II of the Americans with Disabilities Act (ADA) creates clear regulations that all ADA transit must adhere to. (Note: A 'Non-ADA Paratransit Trip' is outside the $\frac{3}{4}$ of a mile requirement and is outside fixed-route operating hours. Non-ADA Paratransit trips are not regulated under the ADA).

Conventional Transit

Traditional fixed route transit systems.

Dial-a-Ride

Scheduling a ride using the telephone with a requirement of booking a ride a minimum of 24-48 hours in advance.

Demand Responsive Transport (also referred to as Demand-Response)

A passenger-oriented form of flexible shared transportation. Vehicles do not follow a fixed route and timetable, rather they alter their route based on customer demand.

First-Mile/Last-Mile (FMLM)

The trip to and from a transit hub, mobility station and fixed-route transit services at the beginning and end of a journey.

Microtransit

Small scale, on-demand technology driven shared ride service. It uses vehicles such as sedans, vans and mini-buses to provide first/last mile connections.

Mobility on Demand (MOD)

Is an innovative user focused approach where individuals can access transit service without an advance booking using real time data, and integrated transportation networks.

On-Demand Transit

Real-time service where riders can book and ride on the same day; booking is available through technological web or mobile App, with the ability to book over the phone

Paratransit

Individualized transportation service without fixed routes and schedules to accommodate persons with disabilities.

Private Service Providers

Non-government companies that provide transportation services.

Public-Private Partnerships (PPP)

Partnerships between governments and the private sector to build infrastructure or provide a service.

Transportation Network Company (TNC)

A company that arranges users transportation through an online enabled platform. A customer is matched up with a driver in a privately owned vehicle and pays via the online enabled platform.

Travel Training

The practice of teaching people how to independently travel on public transportation. This is most often provided to people who have cognitive or physical disabilities other than blindness or low vision.

Universal Design

Design that creates environments that are usable, enjoyable, and understandable for the widest possible range of people, based on several factors including age, size, gender, health, ethnicity, and disability.

Wheelchair Accessible Vehicle (WAV)

Includes vehicles equipped with lifts or ramps which allow access and egress for persons using a wheelchair or mobility devise. For example, a lift-equipped modified taxi van is a common WAV used for services.



Section G:

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SECTION F: LEXICON

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