

TORONTO TRANSIT COMMISSION REPORT NO.

MEETING DATE: November 17, 2009

SUBJECT: Review of Smartcards at the TTC and the PRESTO Smartcard System

ACTION ITEM

RECOMMENDATION

It is recommended that the Commission:

1. Approve the adoption of the PRESTO fare collection system subject to satisfactory resolution of the issues outlined in Attachment A, noting that:
 - TTC and City staff will undertake discussions with representatives of the Federal Government, Provincial Government, Metrolinx and the City of Toronto to develop operating and financial agreements necessary to resolve the issues outlined in Attachment A;
 - TTC staff will report back to the Commission for approval of the operating and financial agreements that have been developed;
 - TTC staff will develop detailed business requirements for adopting the PRESTO system at the TTC;
 - TTC staff will undertake the engineering and design work necessary for future subway infrastructure modifications to provide power and communications to support smartcards.
2. Forward this report to the City of Toronto's Executive Committee.

FUNDING

Funding of \$140 million is included under Program 5.2 Integrated Ticketing System – GTA Farecard Project (as outlined on pages 1171-1173) in the approved 2010-2014 Capital Program as approved by the Commission on September 24, 2009. Funding of \$140 million was included under the Canada Strategic Infrastructure Fund (CSIF), to be shared by Canada, Ontario and the City of Toronto, pending execution of a Contribution Agreement and completion of a satisfactory business case. Funding for the implementation and operation of PRESTO interface readers on turnstiles at up to twelve subway stations is to be funded entirely by PRESTO. The cost for these interface readers does not form part of the \$140 million identified for this project.

The costs necessary to complete the detailed business requirements, and for the engineering and design work for TTC infrastructure changes can be accommodated within the \$140

million that has been approved for the smartcard project to date. However, it is important to note that the \$140 million is not sufficient to fully implement the PRESTO smartcard system at the TTC.

The most recent estimate for a TTC owned and operated smartcard system is approximately \$417M. The, as yet, unfunded portion of the total estimated costs (\$277M) is included in the "below-the-line" section of the TTC's 2010-2014 Capital Program (as outlined on pages 1533-1535). In addition, the costs for Transit City (\$55 million +) and the Yonge and Spadina subway extensions (\$18 million +) are not included in this system cost, for which the total cost would increase to approximately \$490M.

However, the overall capital costs for the TTC and City to implement PRESTO would be less than a TTC owned and operated system. This is because the Province would be assuming certain expenses related to the development and implementation of the PRESTO system, including changes required to the PRESTO central system.

Agreements with the Federal, Provincial and City of Toronto Governments will be necessary to address full funding of this project before a commitment to full implementation can be achieved.

BACKGROUND

In June 2007, the Commission approved a staff report entitled "Business Case Review for a Smartcard System at the TTC". This report outlined a concept of operations for a smartcard system at the TTC. The report assessed the potential benefits, issues, risks and costs for a smartcard system that would be owned and operated by the TTC. The report concluded that smartcard systems did have a potential range of benefits for customers, staff safety and security, fare policy flexibility, and improved data for decision-making. The report also identified potential risks associated with smartcard systems including: significant investment that is difficult to "turn back" once implemented; the "traditional" approach to smartcards could become outdated technically by the time the system is fully implemented; adopting a system could tie the TTC to a proprietary technology; and greater responsibilities to protect and maintain overall system security and the privacy of customer data. The report further concluded that while the TTC's current fare system has limitations, it did not need to be replaced.

The 2007 report included a cost estimate for a TTC smartcard system of approximately \$260M (\$2006). The most recent TTC estimate is \$417M, and reflects updated requirements and escalated dollars (this figure does not include requirements for Transit City or the planned extensions to the TTC subway). The 2007 report also noted that annual operating expenses would increase approximately \$12M per year once a smartcard system was implemented, with further unknown impacts on TTC revenues related to fare evasion and potential changes that may be required to TTC's current transfer policies.

The 2007 report also compared the TTC's concept of operations to the Provincial smartcard

initiative (PRESTO). It was concluded that there were some TTC business needs that were not fully supported by PRESTO at that time. The Commission directed TTC staff to review with the Province how TTC business needs could be accommodated by PRESTO and what the overall financial impact would be for the TTC/City if the TTC joined PRESTO.

The Commission also directed staff to review three other issues:

- The opportunities for a public/private partnership model for the implementation of a TTC smartcard system;
- The value of hosting a vendor day to educate TTC on latest technological advances in the field; and
- Other examples world-wide where the suburbs have implemented a smartcard system ahead of a large metropolitan area they surround.

This report provides an update on the questions and actions outlined above, and identifies a future direction for electronic payments at the TTC.

DISCUSSION

A) Overview of PRESTO

PRESTO is a Provincially led initiative to implement a common smartcard system across the GTA. The Province has entered into agreements with the 905 transit agencies and OC Transpo that define an overall business model for how PRESTO will be governed, managed, operated and funded. Under these agreements, the Province will own and be responsible for operating the Central System that will provide a range of centralized services for both the transit agencies and PRESTO customers (e.g. customer account management; call centre; website; financial reconciliation). The joint agreements also provide the Province with the authority and responsibility for key aspects of the project, including procurement, overall project management, implementation, and operation of the system.

Acting in their role as “agent” for all the transit agencies, the Province has entered into a \$250M contract with Accenture for a ten-year period to develop, build, operate and maintain the PRESTO system. The current contract expires in 2016 but has provisions that could extend this to 2025. Metrolinx currently holds the contract on behalf of all participating agencies, and may ultimately assume responsibility for the on-going operation of PRESTO. It is important to note that the current contract with Accenture does *not* include the full functionality and devices for a future TTC smartcard system. The TTC’s only current commitment with the Province is to allow PRESTO interface readers to be installed on turnstiles at up to 12 TTC subway stations.

For the past few years, PRESTO has been working with the participating transit agencies and the system vendor to develop the system design for PRESTO and the overall plan for implementation. Testing is being conducted with the current version of the system hardware and software, and PRESTO is targeting the initial stage of implementation for later this month. PRESTO expects full implementation of the system with the participating transit

agencies to be completed by the second quarter of 2011.

B) TTC Review of PRESTO

TTC staff have continued to work closely with PRESTO to answer the following questions:

- Will the PRESTO system be able to address TTC business needs (current and future)?
- What is the impact of PRESTO on TTC customers and operations?
- Under the PRESTO business model, will the TTC have acceptable authority over transit related decisions that impact TTC customers and operations?
- Is the PRESTO system affordable for the TTC and City (capital and operating; short-term and long-term)?
- Will the TTC and City be able to take advantage of future opportunities and technologies related to electronic payments?

While progress has been made on these questions, there are still some outstanding issues that will need to be clarified in further discussions with PRESTO before a more definitive understanding of the impacts of the TTC joining PRESTO can be confirmed. Some of these items are outlined below.

From a technical perspective, the PRESTO system is still being developed and tested, but it is not clear at this time how certain aspects of the system will be implemented. The PRESTO roll-out that is planned through 2011 will demonstrate some of the TTC's required functionality, but there are still some important elements (e.g. calendar passes; transfers; limited use cards; Wheel Trans; cross-boundary services) that may not be functional until after this date. Furthermore, it is not clear how the PRESTO functionality will be affected by the order of magnitude increase in smartcard usage the TTC will bring to the PRESTO system.

PRESTO has recognized that changes will be necessary to the central system to meet TTC business needs, and they have made a high-level commitment to make these changes. However, due to the inherent complexity of smartcard systems, there is still the risk that certain TTC needs may not be fully met and/or affordable in the eventual solution. TTC will need to ensure that the impacts to its customers and operations are minimized, and the approach for achieving this balance needs to be worked out with PRESTO.

There are also questions that will need to be reviewed further related to the "non-technical" aspects of the TTC joining PRESTO. The PRESTO business model would change the current level of autonomy that TTC has over certain decisions that are made related to the way that fares and fare media are distributed, purchased and collected on the TTC. Considering that almost \$1 billion in TTC passenger revenues would be processed through PRESTO, it is important that a meaningful role be maintained for the TTC and City within the PRESTO business model related to the way in which decisions are made that will impact TTC customers, City residents and TTC operations. The TTC needs further discussions with PRESTO to determine how this can be achieved.

From a financial perspective, smartcard systems involve a significant investment to implement, and once operational, have the potential to increase on-going operating expenses. There are some key questions that need to be addressed, including:

- What are the overall costs (capital and operating) for the TTC and City from participating in PRESTO?
- What is the overall funding that the Federal and Provincial Governments will be providing to offset the capital and operating expenses of TTC joining PRESTO?
- If actual expenses exceed funded levels, how will the additional costs be addressed?
- What is the long-term approach for funding the system once the current operational and funding agreements expire?

There have been extensive discussions on these issues, but the positions of PRESTO and the various levels of government will need to be confirmed before the financial implications and risks for the City of the TTC joining PRESTO can be determined.

The 2007 TTC concept of operations highlighted the importance of establishing an electronic fare collection system that would provide the flexibility of using the card for purposes in addition to transit (e.g. City services; retail), and to take advantage of alternative approaches to fare payments (e.g. bankcards; cell phones). In particular, there is significant interest developing within the transit industry to enable customers to pay their fares using cards issued by financial institutions (e.g. debit and credit cards). Major transit systems such as New York, London, Paris, Chicago, Montreal and Washington are at various stages of reviewing this "open payments" approach. The City of Toronto has confirmed that this is a key element for any future electronic payment system at the TTC. PRESTO has expressed interest in this approach, but the parameters for addressing "open payments" with PRESTO will need to be confirmed.

C) The Future for Smartcards at the TTC

There are two fundamental questions that the TTC needs to consider:

1. Should the TTC commit to replace its current fare collection system with an electronic payments system?
2. Should the TTC commit to joining the PRESTO system?

The first question can be rephrased to ask in what direction does the TTC want to take its fare collection system over the next decade? The answer to this question has the potential to significantly redefine the manner in which the TTC interacts with and services its customers from a fare payment perspective.

The 2007 TTC Business Case Review on Smartcards concluded that the current fare system is simple, efficient and reliable. It also identified definite limitations, including less convenience for customers transferring between different transit systems, the lack of flexibility of the system to implement new fare policies and products and to take advantage of non-fare revenues, and the limited ability of the system to generate information for

management. Since 2007, there have also been increasing concerns with the current fare system related to the counterfeiting of fare media and how the existing system contributes to disputes between customers and employees.

Furthermore, the 2007 report identified a range of potential benefits from smartcard systems, including significant enhancements to customer service and customer convenience, and increased employee safety and security. The benefits cited in 2007 have become even more relevant as the financial payments industry is moving to greater flexibility for customers by providing consumers with greater options such as making purchases and payments from the convenience of their home through the internet and using their phones. The next ten years will likely see an increase in the convenience and flexibility provided to consumers, and they will expect and demand the same from their transit properties.

The TTC's recent efforts to enhance the safety and security of its employees would be further improved by moving to smartcards. A smartcard system would reduce the amount of cash throughout the system. Further, there is the expectation that a smartcard system may reduce the number of assaults by removing the operator from the fare validation process on surface vehicles. The automation of the fare payment process is believed to make the exchange with the customer less "personal" and lead to fewer confrontations.

Overall, there are sufficient benefits for the TTC and its customers to reaffirm the TTC's commitment to the concept of operations for a smartcard system that was initially approved by the Commission in June, 2007. In so doing, the Commission would be supporting a direction for the TTC's fare collection system that seeks to provide customers with payment options and convenience that do not exist with the current system, enhances the TTC's customer service approach, reduces the risk to frontline employees, and positions the TTC to take better advantage of future developments in technology and the payments industry.

There is no doubt that there are risks associated with moving to a smartcard system, and the key risks identified in the 2007 report remain. For a smartcard system to be successful, the TTC would need to define an approach that enables these risks to be managed and reduced to an acceptable level, while also moving forward in a process that maximizes the likelihood of achieving the benefits associated with smartcards.

While the TTC could likely take steps to manage the potential risks with smartcards, a fundamental barrier to implementing smartcards is its price tag. The most recent estimate for a TTC owned and operated system is approximately \$417M. If the costs for Transit City and the Yonge and Spadina subway extensions are included, this figure increases to approximately \$490M. The TTC's Capital Budget is already under significant pressure without the added expense of a smartcard system. So while the concept of smartcards is good, it is important to have clearly defined sources of funding and a plan to manage the potential risks to turn the concept into reality.

It is within this context that the second question outlined at the beginning of this section is addressed: Should the TTC commit to joining the PRESTO system? Not surprisingly, there are both potential benefits and risks from joining PRESTO under its current business model.

If the TTC were to join PRESTO, there would be benefits for interregional customers who could use one payment card on multiple transit systems throughout the GTA. There is no doubt that without the full participation of TTC, the interregional benefits of the PRESTO system would be reduced.

From a business needs perspective, the PRESTO system should provide much of the basic functionality outlined in the TTC's 2007 concept of operations. The TTC can, therefore, take advantage of the significant work that has been conducted by PRESTO over the past few years. And while TTC has additional business needs, PRESTO has acknowledged these and has made high-level commitments to make changes to the PRESTO system necessary to address these.

From a financial perspective, the overall capital costs under PRESTO for the TTC and City to implement smartcards would be less than a TTC owned and operated system. This is because the Province would be assuming certain expenses related to the development and implementation of the system, including changes required to the central system.

While the above outlines some of the specific potential benefits from the TTC joining PRESTO, there is an important and broader context within which this issue needs to be considered. Over the past few years, the Province has implemented specific programs to provide a range of funding for transit and the TTC. The funding for some of these programs is, however, contingent upon TTC participation in the PRESTO system (i.e. CSIF; gas tax). In addition, the Province has also stated that the adoption of the PRESTO farecard system will be a requirement for new transit projects (i.e. Transit City; subway extensions). The reality is that through these various programs, there is a significant amount of funding for various transit initiatives that is linked to TTC's participation in PRESTO. If the TTC did not join PRESTO, it could put funding for these programs at risk. The decision for the TTC to join PRESTO, therefore, has potential implications that go well beyond the smartcard system itself.

Based on the factors discussed above, there is sufficient justification for the TTC to commit to the concept of smartcards and for joining the PRESTO system. The TTC commitment to join PRESTO will need to be conditional upon developing operating and financial agreements with the Province, Metrolinx and the Federal Government that address the issues discussed earlier in this report (Section B) and reflect the principles identified in Attachment A. The resulting agreements must establish a framework within which the risks to the City, the TTC and its customers can be minimized, while simultaneously providing the mechanisms to achieve the benefits that smartcard systems promise. The ultimate timeframe for implementing PRESTO at the TTC will be highly dependent upon the results of these discussions.

D) Next Steps

The following are the next steps that will be undertaken to move this project forward. It should be noted that these steps can be done in parallel:

- Develop with representatives of the Province, Metrolinx and the City of Toronto operating and financial agreements required for the TTC to adopt the PRESTO fare system.
- Meet with representatives of the Federal Government to confirm the funding available for implementing PRESTO at the TTC and to develop any necessary agreements.
- TTC staff will develop detailed business requirements for smartcards at the TTC. This is a standard, up-front process required by all major IT projects. The detailed business requirements process is aimed at understanding the “what” and “why” of the TTC’s smartcard needs in order for the correct system to be designed and implemented and be fit for purpose at the TTC. The process will include the identification, validation and documentation of all the required business processes, customer interactions, operations, etc. identified by the TTC in order to support a smartcard system.
- TTC staff will initiate the engineering and design work necessary for future subway infrastructure modifications required to provide the power and communications to support smartcards.

E) Response to Other Commission Items From June, 2007

The Commission directed staff to follow-up on three further issues at its June 2007 meeting (see Background). Two of these – opportunities for public/private partnerships, and the value of hosting a vendor day – can be addressed during development of the financial and operating agreements with the Province and Metrolinx. The response to these will need to be considered in the overall framework that is developed for the TTC joining PRESTO.

The third issue raised by the Commission related to reviewing examples world-wide where the suburbs have implemented a smartcard system ahead of a large metropolitan area they surround. Parsons Corporation conducted a review of this question that included surveying eight individuals who have had significant experience in the field of fare collection and smartcards (see Attachment B). The report could not identify an instance where a smartcard system had been implemented ahead of a large metropolitan area. The report did determine, though, that there were examples of smartcard projects that were implemented from a regional perspective.

JUSTIFICATION

A TTC commitment to join the PRESTO smartcard system supports a direction for the TTC to move towards a fare collection system that will provide customers with greater payment options and convenience, enhance the TTC’s customer service approach, reduce the risks to frontline employees, and position the TTC to take better advantage of future developments in the payments industry. The acceptance of the PRESTO system as set out in this report provides TTC staff the opportunity to work with their Federal, Provincial and City counterparts to establish an acceptable framework within which the benefits of smartcards can be delivered, while minimizing the overall risks to the TTC and its customers. There is also a significant amount of funding for other projects and initiatives that is linked to TTC’s

participation in PRESTO, and endorsing TTC's commitment to PRESTO will reduce the risks to these sources of funding.

November 17, 2009

1-38

Attachment A: Key Principles for Developing Agreements Between TTC and PRESTO

Attachment B: Report on Suburban Fare Collection Initiatives

Attachment A:

Key Principles for Developing Agreements Between TTC and PRESTO

- PRESTO will deliver a system that addresses TTC business needs (current and future) in a manner that is acceptable to TTC from a customer, operational, and financial perspective.
- TTC must be able to participate and sign-off on processes and decision points during key stages in the project, including system development and design, procurement, and implementation.
- PRESTO must ensure that the procurement for TTC required equipment and services is conducted in an open and competitive manner and allows for participation by multiple vendors.
- TTC will need a governance and decision-making structure in place that allows the TTC to continue to meet its customer, business and financial needs.
- Funding must be provided to ensure that TTC involvement in PRESTO will be affordable for the TTC and City of Toronto from both a capital and operating perspective, and taking into account the long-term operation of the system.
- TTC and the City of Toronto must be able to take advantage of other opportunities (both transit and non-transit) that smartcard systems provide.
- TTC and the City must be able to take advantage of advances in fare payment approaches (e.g. open payments; mobile phones).



TORONTO TRANSIT COMMISSION

Business Case Analysis for a Smartcard Fare Collection System Suburban Fare Collection Initiatives



January 2008



TORONTO TRANSIT COMMISSION

*Follow Up Task to Commission Motion
Smartcard Project*

Suburban Fare Collection Initiatives

January 2008

PARSONS



1.0 INTRODUCTION

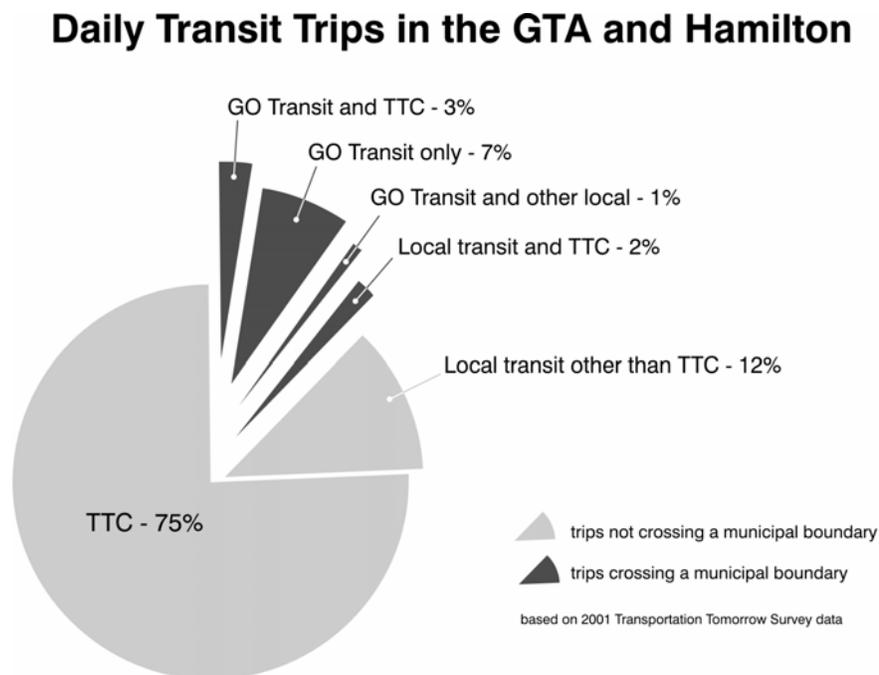
In November 2000, the Commission received and approved a staff report entitled “TTC Fare Collection Study”. The report concluded that the TTC should not proceed with a procurement of a smartcard-based automatic fare collection (AFC) system. Basically, the study found that the existing fare collection system was in good condition, there were no significant operating weaknesses and its costs were fairly low when compared to peer transit agencies.

Around this same time period, GO Transit initiated the Greater Toronto Area Fare System (GTAFS) project with the goal of replacing the fare collection systems of GO Transit and most of the 905 transit agencies with smartcard technology. Throughout 2002 and 2003, GO Transit led and managed an extremely intensive effort to examine and deploy a smartcard-based fare collection system. The vision for the project was to deploy a fare collection system that would enable customers to use the same payment card to travel on any transit system within the Greater Toronto Area (GTA).

In 2004, the Province of Ontario assumed the leadership role and sponsorship of the GTA Fare System Project initiated by GO Transit and its 905 partners. In the same year, the Federal, Provincial and City of Toronto governments made a joint \$1.05 billion funding announcement, of which \$140 million was earmarked for TTC’s portion of an “integrated GTA ticketing system”. Although, the TTC had previously indicated that procuring a smartcard system was not its priority, the three governmental agencies funding the GTAFS project, identified the TTC as a necessary participant. As further incentive to join the GTAFS, the Province of Ontario announced that one of the conditions for receiving revenue from gasoline sales tax was TTC’s participation in the GTAFS.

To realize the vision of unifying the region with one common fare card, it is necessary for the TTC to participate in the GTAFS project. After all, the TTC carries 75 percent of all transit trips in the Greater Toronto Area with only 5 percent of the total ridership crossing the TTC service boundary. Exhibit 1-1, *Daily Transit Trips in the GTA*, shows the distribution of the total daily transit trips by operator within the region.

Exhibit 1-1: Daily Transit Trips in the GTA





In October 2006, the Province of Ontario announced a \$250 million contract awarded Accenture to design, build, operate and maintain a smartcard fare collection system for the transit providers of the GTA. Smartcard fare collection for the TTC was not included in the scope of this contract.

In parallel to the Province's evaluation of a contractor, the TTC undertook another study of the technology and its application to business strategy, financial position and customer service. This Business Case Analysis was a follow up to the one completed and presented in 2000.

On June 13, 2007, the Toronto Transit Commission (TTC) Smartcard Project Team presented the results to the members of the Commission. The members directed the Smartcard Project Team to conduct research to determine if there are other regions, besides Toronto, where suburban operators have taken the lead on initiating, preparing the specifications, procuring and deploying a regional smartcard system in which there is a large metropolitan transit operator either following or not following their lead.

1.1 Research Methodology

PARSONS' services were enlisted by the TTC to conduct a search of regions in which a similar scenario to Toronto exists --- regions where smaller suburban operators took the lead on driving a regional smartcard fare collection project in which there exists a much larger metropolitan transit operator. The team elected to survey equipment providers, consultants and fare collection program managers representing various parts of the industry and world. The following individuals were surveyed:

Neil Poling, Director of Technology, Enterprise Management and Planning, Metropolitan Atlanta Rapid Transit Authority (MARTA) and Chairman, APTA Electronic Fare Payment Systems Committee. Mr. Poling has worked in the area of fare collection for over 15 years and, for the last 7, he led MARTA's BREEZE smartcard project. In this role, one of his most important assignments was to deploy the system regionally, so he investigated the deployment and state of regional systems world-wide and is very knowledgeable about this subject.

David DeKozan, Vice President, Cubic Transportation Systems (CTS). CTS is one of the dominant international providers of fare collection equipment and systems. Mr. DeKozan oversees this area of the business and is very familiar with fare collection activities world-wide.

Gerald Harrison, Manager, Electronic Payment Systems, Parsons Corporation and Vice-Chairman of the APTA Electronic Payment Systems Committee. Mr. Harrison has worked in the area of fare collection for at least fifteen years as staff at Maryland Transit Authority (MTA) and as professional consultant to Washington Metropolitan Area Transit Authority (WMATA) and Southeastern Pennsylvania Transportation Authority (SEPTA). In his role as consultant and Vice-Chair of APTA's committee, he has investigated many smartcard projects world-wide.

Silvester Prakasam, Deputy Director, Fare Systems, Singapore Land Transport Authority. Mr. Prakasam is instrumental in the development and execution of the EZ-Link smartcard system in Singapore and is very familiar with the fare collection activities of Asia.

Richard Thomas, Customer Relationship Manager, Cubic Transportation Group of the United Kingdom and was formerly Prestige Project Business Manager, London Underground. Mr. Thomas has worked in the area of fare collection for 30 years and is very familiar with the activities in Europe.

Joe Simonetti, President, JC Simonetti and Associates. Mr. Simonetti has worked in the fare collection industry for over 20 years, starting as program manager of Chicago Transit Authority's Automated Fare Collection project. He now provides independent consulting services to agencies transitioning to smartcard payment systems.

Brian Stein, Senior Business Development Manager, Scheidt & Bachmann. Scheidt & Bachmann is a German-based firm specializing in fare collection equipment and systems. Mr. Stein is the market



development manager for the company. He is familiar with both European and North American activities in fare collection.

Daniel Fleishman, Vice President, TranSystems. Mr. Fleishman has worked in the area of transit fare collection consulting for nearly 20 years and has also authored many Transit Research Board studies.

1.2 Conclusion

Each individual was asked whether or not they were familiar with the scenario of smaller suburban transit agencies leading a regional smartcard project in which there was a large metropolitan transit agency. Not one individual knew of such a scenario that fit this description. However, there are examples of regions in which a Metropolitan Planning Organization (MPO) initiated such a project. Examples include the following:

- *TransLink*, is the San Francisco, Bay Area regional smartcard fare collection system. Started in 1999, the Metropolitan Transit Commission (MTC) initiated the planning and direction of its deployment. There are 26 transit agencies with MUNI and BART representing the largest ridership. To date, only AC Transit and the Golden Gate ferry and bus system have deployed the system. To support the AC Transit and Golden Gate pilot, BART and MUNI had installed TransLink capability at major stations, but BART later disabled the system to limit customer confusion. MUNI retained its capability. In 2006, BART launched its own pilot program under the "EZ-Rider" name, with the stated intention of transferring EZ-Rider users to TransLink. When questioned about this independent effort, BART representatives imply there are fee and commission disputes between BART and TranLink's management group.

The following describes other regional projects, initiated by a Metropolitan Planning Organization, that have met with more success.

- *EZ-Link*, is the Singaporean smartcard fare collection system. Initiated in 2000, the Land Transport Authority designed and deployed this system. The transport companies, which have operating contracts with LTA, were mandated to adopt the system. The smartcard system was successfully launched.
- *Compass Card*, is the San Diego County smartcard fare collection system. Started in 2002, the Metropolitan Transit Development Board (later San Diego Association of Governments) led the design and deployment effort. The equipment has been installed on all modes and the smartcard will be launched county-wide starting March 2008.