



Metro and the Digital Future

A Unique Pitch-Style Technology Summit

SUMMARY REPORT: November 7, 2014

PREPARED FOR:
Los Angeles County
Metropolitan Transportation Authority

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Metro

Metro and the Digital Future: Summary Report

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Metro and the Digital Future: Summary Report

EXECUTIVE SUMMARY

On November 7, 2014, the Los Angeles County Metropolitan Transportation Authority (Metro) hosted the *Metro and the Digital Future* event. The event provided Metro's leadership with the opportunity to think big and broadly about the "digital future", and to engage with the thought leaders and solution providers of today and tomorrow.

The event attracted approximately 200 participants including industry experts, service providers, Metro executive staff, and the general public. The format and agenda involved the following elements:

- **Opening Session.** Metro executive staff members provided welcoming remarks and an overview of the purpose and format of the event. A panel of industry experts provided brief remarks on lessons learned from technology and customer experience initiatives from Boston, Portland (OR), and Salt Lake City.
- **Concurrent Sessions.** Topical sessions were organized into three topical "tracks" that included presentations from service providers and a critique and observations by a panel of subject matter experts in the following areas:
 - Multi-Modal Integration: Bike Sharing, Car Sharing, and Autonomous Vehicles
 - Station of the Future: Virtual Kiosks, Concierge Services, and Wireless Connectivity
 - Next-Generation Trip Planning / Fare Payment: Smart Trip Planning, Gamification / Loyalty Programs, Next-Gen Fares
- **Closing Session.** The Honorable Eric Garcetti, Chair of the Metro Board of Directors and Mayor of the City of Los Angeles, provided remarks about the imperative for embracing technological advances to improve the Metro customer experience. Additionally, one panelist from each of the three tracks of the concurrent sessions shared his findings and insights as part of a final panel.

Key Findings: Multi-Modal Integration

The Multi-Modal Integration track focused on how to innovate the systems and functionality of newer transportation modes— specifically, bike sharing, car sharing and autonomous vehicles— as integrated with transit services. The following are key findings and overarching themes from each session, as well as insights offered by one of the expert panelists during the closing session.

Bike Sharing

- Lead the region in bike sharing by focusing on policy development, partnerships and implementation.
- Educate the region and “shift the paradigm”: biking can work for everyday trips.
- Embrace making incremental gains to build and sustain momentum.
- Leverage the “natural” and economic forces that facilitate growth of the service.

The expert panelist's insights included the following:

- Use systems that are flexible and open.
- Explore how Assembly Bill 118 (which funds clean vehicle and equipment projects) could incentivize multi-modality, especially in support of social equity.
- Integrate with transit, trip planning and other bike sharing systems.

Car Sharing

- Build on car sharing's current momentum.
- Leverage technology to operationalize modality.
- Maximize opportunities to improve safety for the customer.
- Build cross-sector partnerships to design, implement and manage integration of transit and car sharing.
- Focus on ensuring ease and convenience for the customer's transfer point from transit to car sharing, or other modes

The expert panelist's insights included the following:

- Improve multi-trip linking capabilities.
- Leverage car sharing's role as a highly complementary service to all other modes.
- Study how Neighborhood Electric Vehicles (NEV's) could be effective for first/last mile.

Autonomous Vehicles

- Address the potential impacts including speed, parking, roadway capacity, and infrastructure.
- Understand how the multi-modal concept could evolve related to autonomous vehicles.
- Be agile in responding to this emerging technology; avoid planning too far ahead.

The expert panelist's insights included the following:

- Link to loyalty and reward programs for maximum value and use.
- Solve the issue of where your car goes after dropping you off.
- Connect to enhanced system and trip planning.
- Avoid planning too far ahead due to many unknowns: technology, parking, roadway capacity, and infrastructure.

Key Findings: Station of the Future

The Station of the Future track focused on different elements of technology—specifically, virtual agents/kiosks, concierge services, and wireless connectivity—that can be integrated into transit stations to improve interactivity with the customer. The following are key findings and overarching themes from each session.

Virtual Agents/Kiosks/Wayfinding

- The cost of installing, operating, and maintaining kiosks will be an important consideration.
- Virtual kiosks could be a good tool to address numerous and diverse audiences and users.

The expert panelist's insights included the following:

- Address how to keep these technologies affordable.
- Improve access and equity through these technologies.
- Find the optimal scale and affordability level.

Concierge Services

- It is important to consider customer access to technology as well as their willingness to *adopt* the technology; both come with different challenges and would involve diverse solutions.
- Users will expect a seamless experience.
- Identify how the experience be taken to the next level.
- Define the requirements for additional infrastructure.

The expert panelist's insights included the following:

- Concierge services should be layered, accessible and affordable for transit agencies.
- Focus on the customer experience.
- Leverage the many possibilities of “beacons” through signals and applications to improve service delivery.
- Utilize services that are low-cost and low-maintenance.
- Employ wayfinding technologies for easy navigation of systems.
- Improve passenger and fare tracking capabilities.

Wireless Connectivity

- Stronger connectivity can improve management of fares, safety and data.
- Connectivity is at the heart of creating the bus of the future, expanding its utility and value as a connectivity site.
- Consolidating systems will support easier and more efficient systems management. Consolidation could occur with other infrastructure systems such as public safety.

The expert panelist's insights included the following:

- Create stronger connectivity for fares, safety and data needs, and to create the bus of the future.
- Consolidate connected systems; less is more.

Key Findings: Smart Trip Planning and Next-Gen Fare Payments

The Smart Trip Planning and Next-Gen Fare Payments track focused on how technology can facilitate a seamless, enjoyable trip for the customer. Sessions included Smart Trip Planning, Gamification/Loyalty Programs, and Next-Gen Trip/Fare Systems. The following are key findings and overarching themes from each session.

Smart Trip Planning

- To have a successful and truly usable smart trip planner, there needs to be collaboration across modes – going beyond bus and rail to include paratransit, taxis, bike sharing and walking.
- The customer needs to see the trip planner as “always on, always connected.”
- Real-time information that can be “pushed” to the customer en route increases the value of the trip planner but the customer must be able to trust that the information is reliable.
- Open data and open information sharing is critical to success in smart trip planning but definition of what constitutes “open” varies.

The expert panelist's insights included the following:

- Leverage the “gold mine” of data: options and choices.
- Maximize systems' flexibility, agility and openness.

Gamification/Loyalty Programs

- Loyalty programs combined with concierge-like services (as discussed in Concierge Services Track) can work together to increase off-peak use of transit and retail spending.

- Both gaming and loyalty programs can engage, entertain and create community among passengers.
- There are cost and functionality trade-offs between inexpensive, off-the-shelf technologies and customized approaches.

The expert panelist's insights included the following:

- Focus on the experience, and make it fun: on the bus, and with other passengers.
- Develop rewards and points systems to engage users.

Next-Gen Fare Systems

- Customers are expecting payment for the transit trip to be as easy and seamless as any other transaction – using a credit or debit card, a smart phone linked to a card or a “gift certificate” (pass).
- Transactions aboard transit vehicles have unique requirements for customer understanding, speed, security and transaction cost.
- Account-based systems that are operator (or retailer) specific have been the norm. Open systems (pay for anything with any medium) can have challenges in the transit environment, so the trend may be toward hybrid systems.

The expert panelist's insights included the following:

- Invest in real-time ticket/fare management systems.

Key Actions Suggested

During the closing session, representatives of the expert panels for each track and participants in the audience offered final thoughts regarding key actions for Metro's consideration in moving forward.

- Add more tools for customer information.
- Take an incremental and layered approach that builds momentum and provides a feedback loop.
- Utilize beacons to interact with customers.
- Conduct a demonstration project of the impact of free/cheap fares.
- Integrate trip planning for bike sharing and transit.
- Utilize the national information technology systems network.
- Improve projections for timed services.

Key Additional Actions Being Pursued

The event has spawned dialog and further thinking about potential ideas to use tech to improve the Metro customer experience.

- Re-examine procurement policies and practices to facilitate expediting technology pilots and proofs of concept
- Consider experimenting with group video games on board transit vehicles
- Evaluate expanding TAP outlet network to include City and County libraries
- Use Bluetooth Low Energy proximity technology to provide wayfinding in stations; and interesting history for LA Union Station, similar to what was done in Kansas City

INTRODUCTION

On November 7, 2014, Los Angeles County Metropolitan Transportation Authority (Metro) hosted the *Metro and the Digital Future* event. The purpose of the event was to engage industry experts in discussions of how creative technology could help improve the Metro customer experience.

Background

Metro is unique among the nation's transportation agencies. It serves as transportation planner and coordinator, designer, builder and operator for one of the country's largest, most populous counties. More than 9.6 million people – nearly one-third of California's residents – live, work, and play within its 1,433-square-mile service area.



This service area is equally unique and diverse. Los Angeles County alone is home to 88 cities and many unincorporated communities. In addition to Metro, these communities are served by 14 municipal transit systems, a countywide paratransit overlay (Access Services) and many localized community circulators. An extensive commuter rail network – Metrolink – reaches into five adjacent counties. Metro's own services encompass heavy rail, light rail, and a network of bus routes that include both bus rapid transit and conventional fixed route. Metro must focus on how all of these layers can best serve its customers and service area. As technology continues to evolve, Metro continues its ongoing efforts to leverage creative technology to improve the customer experience.

To further inform this effort, Metro hosted a unique pitch-style event that explored technology in public transportation. Solution providers with relevant experience and a talent for innovation pitched their ideas on transit-specific topics. A panel of industry experts from transportation and closely related fields responded with probing questions, responses, and big ideas for how Metro could leverage these innovations to improve the customer experience. Event attendees also added their perspectives, asking questions and identifying opportunities and challenges for the ideas.

Overall, the event provided Metro's leadership with the opportunity to think big and broad about the "digital future", and to engage with the thought leaders and solution providers of today and tomorrow.

Outreach and Media

Metro conducted targeted outreach to engaged key stakeholders with a vested interest in technology and the transportation system, including Metro customers, transit and alternative mode advocates, technology experts and vendors, partner agencies, media outlets, and members of the public. Specific outreach and media notifications included:

- Letters to chief information officers and subject matter experts
- Electronic "e-blast" to service providers
- Create page on *metro.net* and The Source for the public
- Notify media outlets through media release

Event Format and Agenda

The *Metro and the Digital Future* event took place on November 7, 2014, from 8:30 a.m. to 4:00 p.m. at Metro Headquarters, One Gateway Plaza, Los Angeles, CA. Participants pre-registered to ensure adequate space was provided at the available facilities and meeting rooms. Upon signing in, participants received name badges and tickets to allow admission to the opening session, their pre-registered concurrent sessions, and the closing session. Participants also received an agenda handout and information about the location of the sessions. Approximately 200 people attended the event.



Arthur T. Leahy, CEO of Metro, addresses participants.

Opening Session (8:30 a.m. – 9:15 a.m.)

Participants convened in the Board Room for the opening session. Dave Edwards, Chief Information Officer (CIO) for Metro, opened the event by introducing Lindy Lee, Deputy Chief Executive Officer (DCEO) for Metro, who provided welcoming remarks.

Ms. Lee also provided an overview of the L.A. County context and Metro's role as regional planner, builder and transit operator. She also described the Metro Board of Directors' efforts to expand technology with a focus on creating a seamless, positive customer experience. Metro's "Customer Experience Journey" framework illustrates the customer's trip in eight stages from when she starts to travel to when she arrives at her destination, including the "first and last mile" portions. Metro is analyzing each of the stages as a "touch point," developing a better understanding of how the

customer experiences, feels and reflects on Metro at each stage. The stages and examples of specific analysis (noted in parentheses) are:

1. Discover, Plan Commute and Purchase Fare (fare payment)
2. First Mile (bike/car sharing)
3. At the Station/Stop (real-time arrivals)
4. On Boarding (passenger counting; wheelchair ramps; bike racks)
5. Trip Ride (voice announcement; schedule/maps)
6. Arrival at the Station/Stop (wayfinding)
7. Last Mile (bike/car sharing)
8. Customer Experience/Retention (marketing/survey)

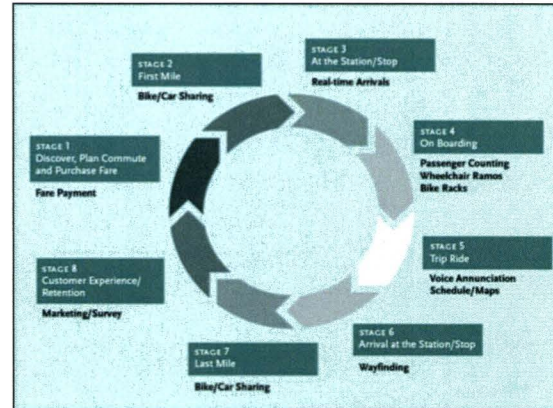


Diagram of the "Customer Experience Journey" created by Metro and Aeon Group LLC

Ms. Lee then described the event's three tracks that organize elements of the customer experience, as follows:

1. Multi-Modal Integration: Bike Sharing, Car Sharing, and Autonomous Vehicles (Stages 2 and 7)
2. Station of the Future: Virtual Kiosks, Concierge Services, and Wireless Connectivity (Stage 3)
3. Next-Generation Trip Planning / Fare Payment: Smart Trip Planning, Gamification / Loyalty Programs, Next-Gen Fares (Stages 1 and 8)

Ms. Lee concluded her presentation by explaining that, ultimately, the goal is to bridge the first and last mile gaps by integrating technologies and new and emerging modes. While Metro is already taking steps to do so, technology is fast moving. Metro is focused on exploring, listening and learning from industry leaders, service providers and event participants to understand what may be most beneficial and cost-effective in the near and long terms. A customer-oriented system will be easier to use, and will more likely increase use of the system.

Mr. Edwards then provided an event overview by summarizing Metro's expectations and desired outcomes, introducing guest CIO's in attendance, and reviewing the event's sessions.

Mr. Edwards then introduced Daniel Iacofano, CEO of MIG, Inc., who served as moderator of a brief panel discussion of transit customer

initiatives from other major transit services. Panelists included Gary Foster, Chief Technology Officer, Massachusetts Bay Transportation Authority (MBTA); Tim McHugh, CIO, TriMet (Portland, OR); and Clair Fiet, Chief of Business Solutions & Technology, Utah Transit Authority (UTA). The panelists provided brief overviews of outcomes and lessons learned regarding their efforts to implement transit customer initiatives.

Mr. Foster explained that, in 2009, MBTA aimed to improve the customer experience in a resource-constrained environment by facilitating a paradigm shift of promoting use of open data and real-time information in the technology development community. Over time, developers created over 50 applications that supported customer information and experience across all MBTA modes including trains, ferry boats, buses and subway. In one year, while focusing only on the customer experience, community perceptions of MBTA's efficiency improved by 20%. Mr. Foster also explained that leadership from the Governor's office and major realignment in the organization and management of the system were the key drivers to making open data a core practice.

Mr. McHugh also highlighted the benefits and opportunities from open data. In particular, in recent years data sharing standards have evolved to and supported TriMet's ability develop a multi-modal trip planner, which is now expandable to unanticipated modes such as bike and car sharing systems. This expanded range of tools has improved the customer experience and is showing great promise to further reduce barriers to accessing services, specifically fare payment systems. Customers expect to use smartphones and credit cards to pay for fares. While technical details and barriers with transit operators and the financial industry are significant, new systems such as Apple Pay offer great promise for advancements.

Mr. Fiet explained the importance of understanding customer needs to ensure solutions are relevant and effective. For example, the "millennial" generation tends to live in cities, wants to use public transportation, is less inclined to have a driver's license, and is very technology dependent. On one congested corridor in the UTA service area, a commuter rail line opened with 10,000 riders in the first year, with 2,000 of those riders utilizing the free Wi-Fi service. After the parallel freeway corridor opened, ridership declined, but the same number of riders continued to use Wi-Fi. Now, with a clear understanding that demand for Wi-Fi services will grow based on technology and communication trends, UTA is planning to implement an enhanced and expanded Wi-Fi system to match demand.

After the panel, Mr. Iacofano briefly recapped the concurrent sessions. He also explained how participants could use their smartphones to scan QR codes at the end of each session, which would take them to a dedicated site for rating each session.

Concurrent Sessions (9:30 a.m. – 3:00 p.m.)

Topical sessions conducted concurrently provided participants with the opportunity to learn about technological advances and opportunities for Metro. The sessions were organized in topical “tracks,” and then within categories, as follows:

	Track 1: Multi-Modal Integration <i>Gateway Plaza Room</i>	Track 2: Station of the Future <i>Union Station Room</i>	Track 3: Smart Trip Planning and Next-Gen Fare Payments <i>Board Room</i>
Session A: 9:30 a.m. – 10:55 a.m.	Bike Sharing	Virtual Agents/ Kiosks	Smart Trip Planning
Session B: 11:05 a.m. – 12:30 p.m.	Car Sharing	Concierge Services	Gamification/ Loyalty Programs
12:30 p.m. – 1:40 p.m.	<i>Lunch</i>		
Session C: 1:40 p.m. – 3:00 p.m.	Autonomous Vehicles	Wireless Connectivity	Next Gen Fares

Each session included ten-minute presentations from three service providers related to the topic area, who were selected by Metro from applications submitted in the weeks before the event. After each presentation, a panel of subject matter experts with transportation and technology expertise provided responses and asked questions. Session attendees also submitted questions and comments in writing. A session facilitator managed the discussions and time schedule, and also wrote high-level notes of discussion items on wall-sized pieces of paper, or “wall graphics.” Summaries of these discussions are provided in the following sections of this report.

Closing Session (3:15 p.m. – 4:00 p.m.)

After the concurrent sessions, participants reconvened in the Board Room. Arthur T. Leahy, CEO of Metro, welcomed participants to the session, and thanked them for their involvement in the event. He then introduced the honorable Eric Garcetti, Chair of the Metro Board of Directors, and Mayor of the City of Los Angeles.



City of Los Angeles Mayor Eric Garcetti, and Metro Board Chair, provides closing remarks.

Mayor Garcetti provided remarks about the imperative for embracing technological advances to improve the Metro customer experience. He challenged Metro and all public agencies to take risks and “fail forward” in pursuit of major advances and system improvements for the betterment of the region’s quality of life. He also pledged to lead Metro and the City of Los Angeles as a proving ground for new technologies, and encouraged service providers and innovators to bring their ideas forward.

Mayor Garcetti then introduced Mr. Iacofano, who reconvened the panel of subject matter experts from the opening session. Anthony Iannucci, Head - Information Services, Toronto Transit Commission replaced Mr. Fiet from the previous panel. Each expert served on the one of the tracks during the concurrent sessions, and they shared their findings and insights as part of this final panel. During their remarks, one of the facilitators wrote high-level notes of their speaking points on a wall graphic. A summary of this discussion is provided in the following sections of this report.

Summary of Sessions

This report summarizes the presentations and discussions from the concurrent and closing sessions. During the discussions, session facilitators wrote high-level notes of discussion items on “wall graphics.” Photo-reduced renderings of the wall graphics are included as an appendix of this report. The report is organized as follows:

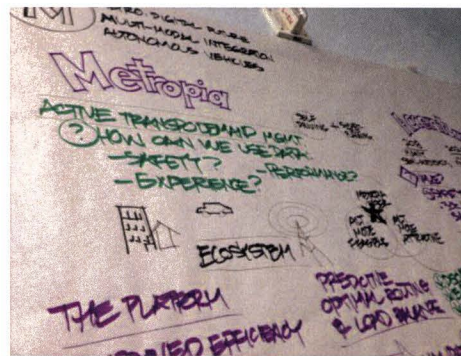
- Multi-Modal Integration
 - Bike Sharing
 - Car Sharing
 - Autonomous Vehicles
- Station of the Future
 - Virtual Agents/Kiosks

- Concierge Services
- Wireless Connectivity
- Smart Trip Planning and Next-Gen Fare Payments
 - Smart Trip Planning
 - Gamification / Loyalty Programs
 - Next Generation Fares
- Closing Session Panel

MULTI-MODAL INTEGRATION

Overview

The Multi-Modal Integration track focused on how to innovate the systems and functionality of other transportation modes as integrated with transit services. Integrating transit with other modes related to customer transfers and payments, as well as co-management of modes, opens opportunities for improving the customer's overall mobility experience and streamlining systems management and functionality. The track's three sessions included:



Wall graphic from the Autonomous Vehicles session.

- **Bike Sharing:** The role and impact of bike sharing in Los Angeles as a smart, effective multi-modal strategy in Los Angeles
- **Car Sharing:** The impact of car sharing and shared ride services on public transit and how they are changing the transportation landscape
- **Autonomous Vehicles:** Driverless technology and its impact on transportation

Subject matter experts for this track included the following representatives:

- Ed Alegre, Transportation Planning Manager, Metro
- Tim McHugh, Chief Information Officer, TriMet (Portland, OR)
- Eric Noble, Founder and President, The CARLAB
- Geoff Wardle, Executive Director of Graduate Transportation Design, Art Center College of Design (Pasadena, CA)

Session 1 – Bike Sharing

Key Themes

Three solution providers each presented their unique “pitch” for technologies, challenges, opportunities, and ideas related to the future of bike sharing in Los Angeles County and Metro’s role. Based on the presentations and ensuing discussions among the presenters, subject matter experts, and audience members, the following key themes emerged across the presentations regarding issues and opportunities facing Metro and bike sharing.

- Lead the region in bike sharing by focusing on policy development, partnerships and implementation.
- Educate the region and “shift the paradigm”: biking can work for everyday trips.
- Embrace making incremental gains to build and sustain momentum.
- Leverage the “natural” and economic forces that facilitate growth of the service.

Social Bicycles

Ryan Rzepecki of Social Bicycles presented information about emerging technologies and innovations in bike sharing hardware and systems. He explained how bike share is well suited for the first and last mile of transit trips. It can provide local circulation within a community and feed people to transit hubs that connect to surrounding neighborhoods and cities. Because the LA Metro area’s mix of high and low-density pockets of commercial and residential uses makes service with traditional bike share difficult, newer smart-bike systems can serve pockets of density on the periphery that can connect effectively to major transit hubs and town centers.

Following Mr. Rzepecki’s presentation, subject matter experts and audience members provided observations and asked questions. His responses are noted in italics.

- How do you choose locations for locating bike stations? – *A number of factors are considered including a location’s density levels, transit access, and tourists’ presence.*
- How can you encourage balanced use of the system, and minimize the impact of fees on users for mis-use? – *An incentives-based approach can help to control these issues.*
- What are the factors in the cost equation for using the service? – *Multiple factors contribute to cost structures and decision-making.*

- Are you able to combine usage patterns and origin and destination data through GPS technology? – *We are pursuing an open data approach that would facilitate this data development and sharing.*
- Does the system integrate with NFC (near-field communication) technology? – *Yes, it can integrate with this transit card system.*

Post-presentation Panel Evaluation and Feedback: Social Bicycles

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- The presentation of how LA bike share suitability via proposed bike stations and a train station was well thought out and executed.
- The model seems very flexible from a cost and deployment perspective. It addresses the variance in density and offers flexibility for deployment based on evolving use over time.
- The concept could benefit from one or two very concrete program samples to draw from.
- There was good consideration of ease of practical and economical access to the system.
- Provides mobile apps for paying and also the ability to dock bike outside station.
- Showed a desire to integrate with different modes – it seems open and primed for integration with other systems.
- Effective bike-share has certainly the potential to improve customer experience for transit riders.
- Additional information would be helpful regarding:
 - Using onboard technology for data purposes
 - Road-sharing issues between bikes and cars

Bike Nation

Derek Fretheim of Bike Nation presented information on the experiences and progress in implementing bike sharing programs in the Southern California region including Fullerton and Long Beach. Overall, he explained that Bike Nation applies a mobility hub focus and developing creative public/private partnerships to design, implement and manage the program that looks beyond just usage revenues. Key factors in successful regional inter-operability include planning proactively and creating fair and equitable partnerships and agreements among agencies. Equitability and convenience for users can be addressed by providing multiple payment methods including smartphone, prepaid cards, cash, and existing fare collection systems (e.g. Metro's TAP fare payment card).

Following his presentation, subject matter experts and audience members provided observations and asked questions. His responses are noted in italics.

- How can agencies create successful partnership agreements? – *Jurisdictions need to be flexible, and willing to commit to long-term agreements and investments.*
- How can social service agencies be engaged to enhance equitable access? – *Leveraging Job Access and Reverse Commute (JARC) funds and other voucher programs are promising opportunities.*

Post-presentation Panel Evaluation and Feedback: Bike Nation

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- Clearly understands the opportunity available and the challenge of integrating into Metro environments.
- Provided solutions for equity on payment/membership.
- The emphasis is reliance on government, leading to high capital costs, and low flexibility.
- While it can improve the customer experience if stations align with need, the focus on sustainable installation could interfere with deployment.
- Understands the barriers to adoption by administrations and customers.
- Additional information would be helpful regarding:
 - How their system compares physically and integrates with other systems
 - Customer experiences in using the system
 - The human-centered aspects of persuading people to adopt bike share

Gladstein, Neandross & Associates

Alex Hammer-Barulich of Gladstein presented the latest developments in pursuing vehicle displacement/retirement of low-use, high-emissions vehicles with incentives to utilize transit, personal bike, and bike-share. California Assembly Bill 118 is the Enhanced Fleet Modernization Act, aiming to implement such a program. The target audience for this program is the approximately 35% of Metro transit users who have a car they are not using frequently for commuting. The components include providing a transit monthly pass (ideally, a hybrid TAP product applied to non-transit, alternative uses), and addressing equity through

encouragement of a “social justice match,” particularly by linking corporate social responsibility opportunities.

Following his presentation, subject matter experts and audience members provided observations and asked questions. His responses are noted in italics.

- Who are the targeted, prototypical drivers and vehicle owners? – *A focus would be on those drivers and vehicles that have a high vehicle-miles-traveled (VMT) and emissions.*
- What are the targeted vehicle types? – *Older vehicles are important as they generally tend to have higher emissions. Many are typically found in environmental justice communities.*
- What would be Metro’s role? – *Metro could be a major partner, possibly co-managing the program.*
- What is the funding source? – *AB 118 funds clean vehicle and equipment projects.*

Post-presentation Panel Evaluation and Feedback: Gladstein, Neandross & Associates

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- Demonstrated good understanding through research and local knowledge.
- The presenter understands the challenges of disadvantaged communities and income – discussion of the number of low income riders was informative.
- Had a strong emphasis on improving traveling options for the economically challenged.
- Appreciated their approach to coordinating different mobility options rather than competing – “collaboration not combat.”
- Some of the details of the program were assumed – need a bit more orientation and more detail on how the program works and how it benefits Metro.

Session 2 – Car Sharing

Key Themes

Three solution providers each presented their unique “pitch” for technologies, challenges, opportunities, and ideas related to the future of car sharing in Los Angeles County and Metro’s role. Based on the presentations and ensuing discussions among the presenters, subject matter experts, and audience members, the following key themes emerged across the presentations.

- Build on car sharing’s current momentum.
- Leverage technology to operationalize multi-modality.
- Maximize opportunities to improve safety for the customer.
- Build cross-sector partnerships to design, implement and manage integration of transit and car sharing.
- Focus on ensuring ease and convenience for the customer’s transfer point from transit to car sharing, or other modes.

Cambridge Systematics

Paul Sorenson of Cambridge Systematics presented the “1-Click” system, which extends multi-modal trip planning to serve individuals that qualify for specialized transportation services based on such factors as age, physical disability, or Veteran status. As an off-the-shelf, open-source trip planner, it is designed to meet the needs of all population segments, and to encompass both existing and emerging travel modes (e.g., transit, paratransit, volunteer-based, taxi, shared services, etc.). 1-Click is also set up to allow human service agencies to plan trips on behalf of their clients, and supports Return-to-Work programs through multiple Origin-Destination trip comparison. Metro’s use of 1-Click could expand its service offerings to existing and future customers, leveraging existing ridesharing and TDM services, and expanding over time to include emerging modes such as car sharing.

Following his presentation, subject matter experts and audience members provided observations and asked questions. His responses are noted in italics.

- Is fare information available? – *Yes, this can be provided outside of the meeting session.*
- Who provides the “back office” support? – *Social services agencies provide the customer service interface, while Cambridge Systematics addresses information technology troubleshooting.*
- What are future improvements to the user-friendliness of the interface? – *Over time, as the system expands and engages more*

partners, we will encounter more opportunities to pursue improvements.

- How are paratransit services integrated into this system? – *The system provides windows of service and contact info.*
- How can the interface be improved for disabled users? – *We are pursuing improvements to support disabled users.*

Post-presentation Panel Evaluation and Feedback: Cambridge Systematics

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- The presenter related to Metro's goal of multi-modal integration, clearly articulating how this option fits in, including paratransit links.
- The approach has the ability to integrate different modes and services.
- It provides customers with an option for trip planning.
- Additional information would be helpful regarding:
 - User stats from roll-out markets
 - Clarity on the direct linkage and applicability to Los Angeles
 - How this open-source system would benefit car sharing
 - The underlying technology

Lyft

Veronica Juarez with Lyft presented the latest developments in the organization's efforts to maximize its services in providing first/last-mile connectivity from transit. She noted key statistics regarding the opportunities for car sharing: that 80% of car seats are always empty, and 90% of Lyft's trips from certain transit stations to major employment centers are duplicated within 5 minutes. "Lyft Line" is focused on bundling more of these commuter trips for enhanced efficiency of its services and reduced fees for its customers. While in the early stages, Lyft is motivated to engage closely with Metro in understanding how formalized partnerships and services can address first/last mile connectivity.

Following her presentation, subject matter experts and audience members provided observations and asked questions. Her responses are noted in italics.

- What do you see as the key opportunity offered by Lyft? – *The service could be integrated with multi-modal solutions, and help to meet the needs of transit-dependent populations.*
- What is the fare benefit for using Lyft Line? – *Customers may save 40%-50% from the standard Lyft fare.*

- In what ways have you engaged public agencies? – *Lyft's primary engagement with the public sector has been through pursuit of regulatory reforms that support car-sharing services.*
- How could integrated transit and Lyft service work? – *The services are very complementary. Each service could incentivize use of the other.*
- Can Lyft service be integrated with trip planning systems? – *Lyft is motivated to link to an enterprise offering.*

Post-presentation Panel Evaluation and Feedback: Lyft

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- Outstanding presentation showed that Lyft is willing and able to successfully integrate with transit agencies, supporting first/last mile connectivity or as an alternative to transit.
- While the presentation did not directly relate to the Los Angeles context, Lyft's experience with car-centric cities is applicable.
- Car sharing seems to be much easier to implement (legacy industry resistance aside) than other alternative solutions.
- Definitely a supportive service in real time – a great complementary service.
- Some of the separations of offerings could have been clearer (i.e., Lyft Line, employer, enterprise) but it sounds like it's quickly emerging.

Civic Projects

Kati Rubinyi of Civic Projects presented on a proposal for a system of cost-sharing of locally shared zero-emissions Neighborhood Electric Vehicles (NEV's) for first/last mile. A public-private partnership for car-share of NEV's around transit-hubs could be part of the transit system while sharing costs (and generating revenue) for the service with the private sector. For free or a minimal cost, users would have access to a fleet of shared NEV's owned by Metro within a 2-mile radius of the transit hub. Users could also use the vehicles for short local trips, at lunchtime or for appointments, bolstering local economic activity by providing a low-cost, non-polluting way to access nearby goods and services, as well as benefitting commuters who live in the area of the station. Projected costs, per car, are at least three times the cost of owning and operating a vehicle. To mitigate the cost, generate revenue for Metro, and create a market for local mobility with the potential to expand, property owners and/or employers, along with retail tenants adjacent to "TOD" transit hubs, would contribute a monthly or yearly fee to help offset the operational costs of a

fleet of shared NEV's owned by Metro. Individuals borrowing the vehicles would not have to pay more than a minimal fee per each use of the vehicle, but they would need to have clean driving records and be over 18 years of age, essentially being a member of the NEV-share system.

Following her presentation, subject matter experts and audience members provided observations and asked questions. Her responses are noted in italics.

- Do the vehicles function on higher-speed streets? – *The vehicles function best on 25 mph streets.*
- How would vehicles be redistributed in the service area? – *Existing companies that collect shopping carts have expressed interest in providing this service.*
- Could the system work in lower-density environments/communities? – *Tightly-planned environments where multiple interests/partners (e.g., developers, tenants, customers) are partnered could make it feasible.*

Post-presentation Panel Evaluation and Feedback: Civic Projects

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- Demonstrated good understanding based on presenter's knowledge of local area and urban planning by showing a way to create veins and capillaries for Metro's "arteries."
- Solves last/first mile for many who cannot use human power.
- NEV's have a valuable role to play in the overall integrated transit solution if the regulatory framework and designs support them.
- The presenter could have provided more examples/illustrations.
- A pilot program is needed.

Session 3 – Autonomous Vehicles

Key Themes

Three solution providers each presented their unique "pitch" for technologies, challenges, opportunities, and ideas related to the future of autonomous vehicles in Los Angeles County and Metro's role. Based on the presentations and ensuing discussions among the presenters, subject matter experts, and audience members, the following key themes emerged across the presentations.

- Address the potential impacts including speed, parking, roadway capacity, and infrastructure.

- Understand how the multi-modal concept could evolve related to autonomous vehicles.
- Be agile in responding to this emerging technology—avoid planning too far ahead.

Metropia

Vassilis Papayannoulis of Metropia explained how its mobile application incentivizes automobile users to switch to other modes such as transit or biking, or for driving outside of rush hours and off congested routes. Metropia is able to identify certain automobile drivers who have a promising or attractive alternative mode option but never had a motivation or inclination to switch their travel mode. Research shows that once this type of drivers is given a good reason and motivation to try transit, the probability for the driver to become a returning transit rider is higher than other average auto drivers. Metropia could assist Metro in “Lead Generation” of new transit riders by concentrating resources to incentivize targeted non-riders to cost-effectively maximize the conversion. Third, the Metropia’s ability to incentivize and coordinate commuters in making a smart decision in departure time, route, and/or mode could be seamlessly integrated with the future connected and autonomous vehicles.

Following his presentation, subject matter experts and audience members provided observations and asked questions. His responses are noted in italics.

- What is the link to autonomous vehicles? – *The smartphone with Metropia can serve as the vehicle's “brain.”*
- What is the optimization focus? – *It can be tailored specifically to increasing alternative mode share, or reducing roadway congestion.*

Post-presentation Panel Evaluation and Feedback: Metropia

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- The concept is far off and theoretical but it will be good to continue to track it.
- It has the potential to make a large impact and improve the driver experience.
- Beta testing in LA indicates they’re learning to understand LA.
- Additional information would be helpful regarding:
 - The strategic focus
 - The objectives of “optimization”

- Metrics and incentives
- The links to Metro's specific challenges
- Immediate next steps in the LA County area

Accenture

Michael Wilson of Accenture presented how autonomous vehicles and their precursor— connected vehicles— will become the new flavor for which public transportation and infrastructure providers must prepare. Connected vehicles offer a vehicle driver a highly integrated experience, with the ability to take over many driving functions, including navigation and basic driving controls. Public transit providers who embrace this technology will see advantages in two ways: First, those that adopt it for their own vehicles will be able to integrate a layer of safety and reliability that cannot be achieved with manual interventions only. Second, those that prepare for private connected vehicles will use technology to feed data to these vehicles, such that they can be used as feeders to a core public network, rather than competition per se.

Following his presentation, subject matter experts and audience members provided observations and asked questions—. His responses are noted in italics.

- Will these vehicles truly be part of reducing traffic congestion? – *Supply and demand factors will be the larger factors.*
- What policy developments are necessary to facilitate this technology? – *Infrastructure, safety regulations and investment approaches will all be important policy areas.*
- Will these vehicles essentially become roving offices? – *There's the theoretical potential for them to make commuting easier, more comfortable, and more productive.*

Post-presentation Panel Evaluation and Feedback: Accenture

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- Demonstrated understanding that automated vehicles are coming.
- Presentation was somewhat general and theoretical.
- There doesn't appear to be a clear-cut path.
- In LA, there is the potential to improve the customer experience with transit reliability.
- This concept may be more appropriate in LA than in many other places.
- Cell-to-tolling is an improvement.

Metro Parking

Frank Ching with Metro's parking division presented on the future parking innovations under consideration. Related to autonomous vehicles, parking management systems must understand where, how, and if these vehicles will be parked when not moving people. For those that will park away from their home base, it's unclear as to how pricing will factor: will owners pay for the closest or cheapest spaces? In terms of linking vehicles to available spaces, wireless sensor systems that are integrated with automobiles can help direct vehicles efficiently.



Frank Ching (left) of Metro discusses the future of parking and autonomous vehicles with panelists.

Following his presentation, subject matter experts and audience members provided observations and asked questions. His responses are noted in italics.

- How will parking systems of the future link to shared/integrated data? – *Application program interface (API) agreements will be necessary.*
- How will policy evolve in this area? – *For autonomous vehicles that could park or circle empty, policy will address how to manage this functionality. Additionally, how sharing and subscription programs apply to parking could have policy implications.*
- How will Metro utilize excess parking spaces in the future? – *If that is an issue, Metro will consider all options for maximizing the value and use of those spaces for parking or other uses.*

Post-presentation Panel Evaluation and Feedback: Accenture

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- It's obvious that the presenter is a parking expert – a fun and engaging presentation.
- The presenter understands the Metro area's parking problem and how parking relates to congestion, including the benefit of automated parking spots.
- There are lots of unknowns, questions and variables but this concept is heading in the right direction.

STATION OF THE FUTURE

Overview

Defining the Station of the Future track focused on different elements of technology that can be integrated into transit stations to improve interactivity with the customer. Technology in transit stations can facilitate the communication of information between agency and passengers, helping passengers access the services they need, and providing the agency vital information for adapting their services to changing customer demands. The track's three sessions included:



Esmeralda García (right) of MIG facilitates the Station of the Future sessions.

- **Virtual Agents/Kiosks:** The role that interactive, self-help kiosks can play in engaging the customer and improving access to information and services.
- **Concierge Services:** How proximity-based technology can be used to better connect passengers to transit information, simplify ticketing and other benefits.
- **Wireless Connectivity:** The role of Wi-Fi in public transportation. What current infrastructure exists and how can wireless connectivity meet future needs?

Subject matter experts for this track included the following representatives:

- Lan-Chi "Chi" Lam, Director of Communications, Web & Mobile, Metro
- Gary Miskell, Santa Clara Valley Transportation Authority (3rd session only)
- Sidney Gellineau – New York Metropolitan Transportation Authority
- Peter Marx, Deputy Mayor, Technology and Innovation, City of Los Angeles (1st and 2nd sessions only)
- Gary Foster, MBTA and MassDOT, CIO, Chief Technology Officer
- Debra Gerod, Partner, Gruen Associates

Session 1 – Virtual Agents/Kiosks/Wayfinding

Key Themes

The three solution providers in this session were charged with presenting a ten-minute “pitch” on how kiosk technology can improve access to information and services as well as enhance customer engagement. During the question and discussion period that followed, the panel of subject matter experts explored challenges, opportunities and the potential of each approach to meet the needs of customers in Los Angeles Metro's unique multi-modal, multi-operator environment.

Key themes emerging across all three presentations and subsequent discussion were:

- The cost of installing, operating, and maintaining kiosks will be an important consideration.
- Virtual kiosks could be a good tool to address numerous and diverse audiences and users.

XEROX

David Corbin and his colleagues from XEROX presented examples of where app technology was used to provide users real time data to inform how they move about a city. Latest developments include apps that connect transit users to information related to real time changes with schedules. Transit agencies can implement an integrated set of signs and/or monitors placed at a central location (such as a bus transfer terminal) and controlled by a local server. Multimedia touch screen information kiosks provide a wide range of transit, traveler, and tourist information. The XEROX “SmartTraveler Server” provides data management and communications software that can interface with CAD/AVL systems.

Following the presentation, the panel of experts asked questions and provided feedback. Responses to questions are noted in italics.

- How is privacy considered in systems that track user movements? – *Users can opt out and standards would be applied.*
- Is infrastructure security compromised? – *There are measures that have been used that have proven successful.*
- Would kiosks require large bandwidth -- how would you manage this? – *Off-peak times would be used to download data.*
- How would you work with public agencies to implement these systems? – *Partnerships can be developed for public spaces.*
- Apps on smart phones are a good way to provide wayfinding but screens are still necessary.

Post-presentation Panel Evaluation and Feedback: XEROX

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- Presentation demonstrated an understanding of Metro's needs—dealing with service disruption, occasional users, parking problems and business partners.
- Apps for occasional users should be considered.
- The solution could be useful if it integrates driver options and parking with Metro usage.
- A challenge is legacy technology in the context of new technology or ideas to address transit problems.

T-Kartor USA

David Figueroa of T-Kartor provided two case studies that described a new approach to an integrated information system for wayfinding. The technology designed for London and New York provides residents and visitors with updated base map information in order to navigate by foot, public transport, and bike. Overall, a successful wayfinding system will need to be integrated with the public realm and active transit, making customers aware of their nearby surroundings and travel options as well as their broader connectivity to the metropolitan area. The information will need to be designed for optimal usage and quick understanding and should be provided via a combination of digital kiosks, mobile handoffs and static signs - embraced by Business Improvement Districts, cities, bike share programs and major destinations in order to truly address customer needs. In this comprehensive view, a unified wayfinding system can enhance the use and value of public space as well as actively promote better use and understanding of public transit.

Following the presentation, the panel of experts asked questions and provided feedback. Answers to questions are presented in italics.

- How do you reach a diverse set of audiences and users? *We need to keep in mind the local commuters and transit users as well as the visitor and tourist populations.*
- Advertising could be used to promote the program.
- We need to be aware of public perception of using public funds to pay for advertising/promotion.
- How can technologically challenged populations be reached? – *Consider kiosks that do not require app technology and promote the system at bus shelter.*

- Public agencies need to improve their ability to catch up with technology.
- It will be important to strike the right balance of service provision and advertising.

Post-presentation Panel Evaluation and Feedback: T-Kartor

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- Presentation addressed the need to collect information from multiple sources.
- Interesting information on London and New York examples. Something to consider would be the differences between London and LA cultures.
- A question would be if LA has the information platform to put Way Finder in place?
- Maintenance must be considered.

Control Group

David Koenig of Control Group presented a station concept that suggests it is less a place for customers to wait for a train--though they may also continue to do that--but is a nexus of customers and public and private mobility options. That is, it may be seen as a retail outlet for finding, buying and receiving a trip. The Metro station of the future is a mix of in-station- and personal-device-based communication technologies that help the customer discover what options are available for use, managing demand for those options, pricing and paying for those services, and then connecting the customer with his or her selected choice. The station would include a mix of in-station, kiosk-based and mobile-device-based communication options that evolves with customers' use of mobile devices. Proximal technologies would assist passengers in accessing transit vehicles, moving through gates, connecting with last-mile services, and would improve ADA accessibility.

Following the presentation, the panel of experts asked questions and provided feedback. Answers to questions are presented in italics.

- The examples presented have a central brand as a foundation. How can a 'brand' for Los Angeles be established? –*Metro has been successful in branding transit in LA. We can leverage this brand.*
- Is vandalism an issue where this has been implemented and how can this be addressed? –*There is some vandalism but not to the*

extent that one would think. In our examples a maintenance program was established and managed at a local level.

- Address how to mitigate maintenance costs.

Post-presentation Panel Evaluation and Feedback: Control Group

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- The presenter demonstrated a high level of experience with kiosk implementation design and deployment.
- The models that Metro should consider were presented as a conceptual application.
- Kiosks/virtual agents can support many types of customers.
- Security and maintenance are issues are big consideration, especially in an area such as Los Angeles.

Session 2 – Concierge Services

Key Themes

The three solution providers in this session were charged with presenting a ten-minute “pitch” on a solution or approach that could use proximity-based technology to better-connect passengers to transit information, simplify ticketing and other provide users other benefits. Key themes emerging from the three presentations and subsequent discussion were:

- It is important to consider customer access to technology as well as their willingness to *adopt* the technology; both come with different challenges and would involve diverse solutions.
- Users will expect a seamless experience.
- Identify how the experience be taken to the next level.
- Define the requirements for additional infrastructure.

Gimbal

Rocco Fabiano of Gimbal presented information on how advanced geofencing, the world's largest deployment of industry-leading Bluetooth Smart beacons, location-based messaging, analytics, unmatched security features and privacy controls can assist Metro in advancing its concierge services. He explained how this cost-effective beacon technology could assist Metro and other public agencies in reaching services areas that are not compatible with GPS.

Following the presentation, the panel of experts asked questions and provided feedback. Answers to questions are presented in italics.

- Keep in mind the infrastructure that is required.

- Beacons are relatively inexpensive but is it really practical to remove gates?
- Pilot programs could be a method to apply an incremental approach to removing gates.
- How can privacy issues be addressed? – *Through transparency of applications.*

Post-presentation Panel Evaluation and Feedback: Gimbal

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- Beacons work in areas where GPS may not; for example, canyons and tunnels. They are a useful component to delivering city services.
- Geo fencing is the key to making this useful in an immediate environment – a 50-meter range.
- This method supports accessibility via an app – good for ADA usage.
- It's cheap technology and can be used for relatively cost-effective tech pilots and experiments.
- The question of how to address the digital divide remains important.

Aruba

Kiyo Kubo with Aruba Networks presented on the future of proximity based notifications. He explained how their applications have been deployed at the new Levi's Stadium in Santa Clara, California, as an example of its value in supporting a large transit station location. The system can support increasing customer loyalty, personalizing the Wi-Fi experience with branded apps/browser skins, personalizing push notifications for desired services, providing directional support and services, and distributing zone-based and time-based advertisements and coupons.

Following the presentation, the panel of experts asked questions and provided feedback. Answers to questions are presented in italics.

- How can wayfinding accuracy be improved? – *Installation of beacons. These are especially effective below-ground.*
- Are there limitations with using beacons? *There is a limit to app developers. Keys can be provided to developers to ensure security.*
- Address how beacons handle the volume of users. – *Beacons are inexpensive and numerous can be used.*
- Ensure app transparency.
- There continues to be a digital divide between. This needs to be a consideration especially in a diverse area like Los Angeles.

- Acknowledge the difference between adoption of new technology and access to technology. There is a difference between public transit users who have access to cell phones and other digital technology, and those who do not.

Post-presentation Panel Evaluation and Feedback: Aruba

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- May be better in a building than stops or smaller stations but great potential for buildings and larger stations.
- Would a method like this still add value if not used system-wide?
- A question is how to accelerate adoption of this type of technology to address the needs of LA's diverse population.

Accenture

Michael Wilson of Accenture presented on how proximity-based technology to feed customized information to consumers through their mobile devices is perfectly suited to public transportation to benefit its riders. Using technology already available in most smartphones, Metro could not only keep riders alerted of location-specific transportation services (such as transfer points or modal options), but also could partner with retail and city services to improve the journey as a whole (e.g., offer, partner deals with a station-based retailer, or city attractions accessible from a particular destination). Proximity services could be utilized with a number of tactical goals in mind (revenue creation, customer enjoyment, etc.) but with the overarching objective of improving the customer experience.

Following the presentation, the panel of experts asked questions and provided feedback. Answers to questions are presented in *italics*.

- How do you maintain the beacons? - *They are relatively inexpensive and can be replaced.*
- Centralized management will be important.
- How do you coordinate between the different service providers and the various data sets? – *This is an important consideration in Los Angeles where we have different municipalities.*
- Access to transit data needs to be incorporated for system wide use.

Post-presentation Panel Evaluation and Feedback: Accenture

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- Transit is just a piece of the customer's journey.
- A seamless experience between space use, information needs and fare access is important.
- "Low-infrastructure" approach – smart phones, open data and proximity have a lot of potential.

Session 3 – Wireless Connectivity

Key Themes

The three solution providers in this session were charged with presenting a ten-minute "pitch" on a solution or approach that could increase patronage, create customer loyalty or add to the customer's enjoyment of the trip. Key themes emerging from the three presentations and subsequent discussion were:

- Stronger connectivity can improve management of fares, safety and data.
- Connectivity is at the heart of creating the bus of the future; expanding its utility and value as a connectivity site.
- Consolidate connected systems: less is more.
- Consolidating systems will support easier and more efficient systems management. Consolidation could occur with other infrastructure systems such as public safety.

Single Point

Robert Taylo with Single Point Communications stressed the importance of understanding Metro's needs for feeding data to existing or future systems/services. Metro's desired outcomes—whether providing passenger Wi-Fi, infotainment, CCTV offload, or other—should define the best-suited technology.

Following the presentation, the panel of experts asked questions and provided feedback. Answers to questions are presented in italics.

- Define the requirements for network size and capacity.
- How do you support public versus private network? – *A separate public safety network could be an option.*
- A remaining issue is what specifically can be applied to Metro? – *Mesh and private.*
- Expanded analysis would be helpful about the possibilities for vehicle-to-vehicle options

Post-presentation Panel Evaluation and Feedback: Single Point

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- Free Wi-Fi cannot be paid for by advertisement revenue alone; needs to be used in operation as well – for example, capturing surveillance information to learn about passengers.

Sierra Wireless

Robert Boback of Sierra Wireless presented developments in mobile hotspots in and around transit vehicles allowing multiple devices to connect, reducing the proliferation of radio modems, antennas and wireless accounts otherwise needed. The technology can sense and assess available networks, intelligently switching between networks based on a variety of operational factors. Built-in GPS receivers and microcomputers can enable value-added applications such as vehicle tracking, RFID asset tracking, vehicle telemetry, and remote device access. A dashboard provides an up-to-date view of the entire fleet, and a comprehensive reporting suite presents data on-demand, or via pre-scheduled reports.

Following the presentation, the panel of experts provided feedback.

- Study the feasibility of transit agency right of way to serve as micro cell sites.
- Address how public safety networks could be leveraged for transit/public agencies.

Post-presentation Panel Evaluation and Feedback: Sierra Wireless

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- Mobile Wi-Fi can be provided for owner/agency information and can also have parallel public Wi-Fi.
- This is a piece of the solution but DSRC is the future in LA.
- There are still questions regarding vehicle-to-vehicle communication and what effect US DOT directions will have on the future of the network.

Cradle Point

Tom Loutzenheiser with CradlePoint presented experiences in providing secure Wi-Fi and network services over 3G/4G cellular networks for transit authorities to support connectivity for mobile applications, including payment systems, digital signage, GPS tracking and customer Wi-Fi.

3G/4G cellular is becoming ubiquitous, faster, and more affordable in many urban areas. He explained how the “connected bus” can connect exterior and interior digital signage, point-of-sale credit card processors, the bus driver’s tablet, surveillance cameras, and passenger Wi-Fi. Flexibility among the carrier, technology provider, and transit IT team are important to build functional connections tailored to the transit system. Following the presentation, the panel of experts asked questions and provided feedback. Answers to questions are presented in italics.

- There are opportunities to validate passenger counts using analytics from Wi-Fi use data.
- Could public/private partnerships offset costs? – *This could occur by combining app usage with advertising/ media.*
- Consider a business model that focuses on manufacturer.
- What is the reliability rate? – *Rate is based on carrier.*
- What is the lifespan? – *Depends on hardware—good rate plans provide options.*

Post-presentation Panel Evaluation and Feedback: Cradle Point

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- The presentation highlighted public sector issues.
- The presentation discussed the “Bus of the Future” – Wi-Fi information on signage, digital signage for pedestrians, cameras, driver information and a fare processor all integrated
- Multiple parallel networks add security redundancy but need a micro cell to work with subway service.
- This technology makes an interesting tie into credit card (PCI) issues.
- DSCR is not included.

SMART TRIP PLANNING AND NEXT-GEN FARE PAYMENTS

Overview

The Smart Trip Planning and Next-Gen Fare Payments track focused on how technology can facilitate a seamless, enjoyable trip for the customer. This trip is enhanced by technologies that link modes, create a rewarding experience (in more ways than one) and provide easy, convenient fare payment. The track's three sessions included:



A presentation during the Smart Trip Planning and Next-Gen Fare Payments track.

- **Smart Trip Planning:** How technologies and applications can simplify trip planning, particularly in multi-operator, multi-modal environments such as Los Angeles
- **Gamification and Loyalty Programs:** The role of interactive technologies and rewards programs in engaging the customer, keeping and increasing ridership.
- **Next-Gen Trip/Fare Systems:** Current and future technologies that support simple and seamless fare payment in a multi-operator environment, including use of smart phones, contactless cards and behind-the-scenes integration.

Subject matter experts for this track included the following representatives:

- Doug Anderson, Director of Information Technology- Digital Strategy & Innovation, Metro
- Clair Fiet, Chief of Business Solutions & Technology, Utah Transit Authority
- Anthony Lannucci, Chief Information Officer, Toronto Transit Commission
- Luc Lamontagne, Director, Information Technology, STM, Montreal
- Ryan Poscharsky, Strategic Partner Manager, Google
- Doug Anderson, Director of Information Technology, Digital Strategy & Innovation, Metro (1st and 2nd sessions)
- David Sutton, Deputy Executive Officer, TAP Operations, Metro (3rd session)

Session 1 – Smart Trip Planning

Key Themes

The three solution providers in this session were charged with presenting a 10-minute “pitch” on how existing and emerging technologies can improve customer understanding and facilitate trip planning in a multi-modal environment. Two of the solution providers presented products and trends while a third presenter discussed an approach to customer profiling and analysis as a method of personalizing trip planning. In subsequent questions and discussion, the panel of subject matter experts explored challenges, opportunities and the potential of each approach to meet the needs of customers in Los Angeles Metro's unique multi-modal, multi-operator environment.

Key themes emerging across the presentations and discussion were:

- To have a successful and truly usable smart trip planner, there needs to be collaboration across modes – going beyond bus and rail to include paratransit, taxis, bike sharing and walking.
- The customer needs to see the trip planner as “always on, always connected.”
- Real-time information that can be “pushed” to the customer en route increases the value of the trip planner but the customer must be able to trust that the information is reliable.
- Open data and open information sharing is critical to success in smart trip planning but definition of what constitutes “open” varies.

Giro

Anna Bragina, David Fabi and Robert Victor presented applications developed by Giro that provide real-time, personalized trip planning. A major theme and benefit of the Giro approach is to minimize the need for demand-responsive trips by providing a trip that responds to individual customer abilities and transit availability. The presentation provided a case example of how the “always on, always connected” trip planner, could provide up-to-the-minute recommendations based on system availability and trip timing. As demonstrated, the plan is adjusted to account for changes in travel plans or station conditions (such as an out-of-service elevator). The Giro trip planner features open data and APIs and future plans include integration of beacon technology and open payment.

Following the presentation, the expert panel asked questions and discussed some of the opportunities and challenges that the solution presented. Responses to questions are noted in italics.

- What is the next step in application development? – *The next step will be a hybrid application that can be adapted to needs of various customer groups and trip types.*
- What is the benefit of IPI on the Web? – *It will allow us to identify high-frequency “meet” locations.*
- Why not use the established interface protocols developed over the years by APTA with the Federal Government? *The Google interface is much simpler – the existing interface protocols are extremely complex and difficult to interpret and apply.*
- How can an agency get participation and compliance, especially by more independent resources such systems not operated by the agency and taxi companies? *Compatibility and use can be established through business processes and contracts.*

Post-presentation Panel Evaluation and Feedback: Giro

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- The presentation stayed at a high level but was good for the time allowed
- Attractive features include:
 - In-trip and real time changes to get passengers there on time
 - Paratransit and fixed route integration
 - The dashboard/analysis capabilities
 - Route customization and real-time information to the passenger
- The key having accurate data and information passengers can trust.
- This is a longer-term vision – the direct application to the Los Angeles environment is unclear.
- More information could have been provided on how to bring planning into the hand of the customer.
- Integration is key – a particular challenge is taxi integration.

Steer Davies Gleave

Dr. Craig Nelson of Steer Davies Gleave presented SDG's approach, which is designed to support “truly multi modal travel.” It is designed to connect with the customer and with people on the move, providing dynamic trip planning. Network data on cycle and pedestrian routes, area attractions and bus stops is unified on an Open Street Map. GPS allows for trip recalculation, pushes updates to phones and tells the customer why. Trusted information is key to success. The application includes a gamification feature where passengers are informed of healthy alternatives such as walking or biking and rewarded for using them. In

addition to using GPS, SDG believes that it is important to complement an online approach with integrated on-street and wayfinding information.

Following the presentation the expert panel asked questions and provided feedback. Responses to questions are noted in italics.

- What happens if part of the system is down? – *The system provides options to reconsider the route.*
- How would arrangements be done in a multi-agency environment such as Los Angeles? – *It is preferable that one agency take the lead.*
- What additional dynamic features are being incorporated? – *Crowdsourced data.*

Post-presentation Panel Evaluation and Feedback: Steer Davies Gleave

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- The presenter was familiar with current research and efforts regarding vehicle trip planners – and challenges for a city this size. Had good ideas on bringing unique city and system information into the app.
- The presentation was more about the product than on how it meets LA's particular needs.
- A challenge in LA is achieving multi modal integration with multiple, independent services.
- Integrating on-street and wayfinding information and possibly air travel is a good idea – particularly in an environment such as LA where there are many tourists.
- The approach is comprehensive – mobile real-time application integrated with venues, events, lifestyle.
- Researching customer preferences is an important feature.
- It would be good to have more information on how the trip planner works with other initiatives and on implementation, cost and the value proposition.
- Data availability and accuracy are crucial to establishing trust and confidence in the trip planner.

Control Group

Jeff Maki from Control Group discussed the importance of customer research in designing and developing trip planning applications. In Control Group's approach, this personalization is a critical feature in

mobility management, with collaboration across modes – car, bike and transit.

Following the presentation the expert panel asked questions and provided feedback. Responses to questions are noted in italics.

- How are individual cost calculations made? – *We have an “open loop” payment across modes.*
- What are some additional specifics of Control Group’s approach? – *We employ a “design lab” technique, identifying unique customer personas that a mix of services can reach and serve.*

Post-presentation Panel Evaluation and Feedback: Control Group

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- The presentation speaks to the opportunity to adapt to the flow of user trips, along with the complexity of the networks.
- The “design house of good ideas” is intriguing but this is more conceptual and high-level – a think tank.
- A question is how to apply this approach in a complex environment – do we end up trying to be “all things to all people”? Trying to satisfy all riders including a younger generation could be a “space shuttle” (too many things get less done) unless you double down and fully explore.
- This approach will work in a future where data is more readily available on consumers, preferences and services.
- As it now stands, there is question on how to approach beyond multimodal and unestablished company APIs or data to add interoperability.

Session 2 – Gamification/Loyalty Programs

Key Themes

The three solution providers in this session were charged with presenting a ten-minute “pitch” on a solution or approach that could increase patronage, create customer loyalty or add to the customer’s enjoyment of the trip. The presentations were diverse, with one describing experiences and outcomes from a specific application, one discussing how the gaming experience could enhance the overall experience and perception of the trip and yet another talking about options for applying loyalty and gaming concepts to future customer service programs. Key themes emerging from the three presentations and subsequent discussion were:

- Loyalty programs combined with concierge-like services (as discussed in Concierge Services track) can work together to increase off-peak use of transit and retail spending.
- Both gaming and loyalty programs can engage, entertain and create community among passengers.
- There are cost and functionality trade-offs between inexpensive, off-the-shelf technologies and customized approaches.

SAP

Herve Pluche, SAP, described experience with the loyalty program at STM in Montreal, where results in terms of ridership have been immediate and extensive. The emphasis is on innovation – for example, customers earn “trees” for their contributions to the environment through the choices they make. Opal card (smart payment card) purchasing history is used with geo-located options and a self-learning engine. Micro-communities are created with rewards targeted toward local options.

Following the presentation, the expert panel asked questions and discussed some of the opportunities and challenges that the solution presented. Responses to questions are noted in italics.

- What has been the greatest benefit? – *Synergy. The program increases off-peak transit use while also increasing local spending.*
- What is most important for success? – *It's key to gather an internal “ideas” team” that can develop the concept and pull together the resources needed to make it happen.*

Post-presentation Panel Evaluation and Feedback: SAP

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- This provided immediate results, a good opportunity to increase ridership – this message was very powerful.
- The presentation was convincing as to how the Montreal experience can translate to LA – while there were few direct links to LA, improving ridership in LA can be a good candidate for gamification.
- The question is what rewards will be most desirable in LA.
- More information on popularity versus economic incentives would have been useful.
- “Consumers are consumers” – they like to compare themselves to others.
- There are limitless opportunities for connecting commuters.

- The thought that LA could increase ridership to surpass New York is intriguing!

UCLA Game Lab

Eddo Stern, head of UCLA's game lab presented gaming as a way of enhancing the customer experience rather than a singular focus on business and revenue. He posed the opportunity of tapping artistic and experimental game developers and thinkers in developing new ideas. He advocated staying away from conventional approaches to incorporate mobile and location-based gaming and considering the ethics of gamification. Designed to work with different Metro experiences – planning the trip, waiting, traveling, experiencing surroundings, gaming can be a way to entertain and engage customers – and others in locations served by transit – in creating community and a positive, fun atmosphere. Gaming can be enjoyed by everyone – from the “technology Luddite” to the hard-core gamer.

Following the presentation the expert panel asked questions and provided feedback. Responses to questions are noted in italics.

- How can this approach apply here? *–The Game Lab can be at the table and discuss the state of gaming and how gaming can enhance experiences, increasing ridership. Gaming can tie in to other physical locations – for example, on board the accelerometer on the phone can create a train/bus speed game among passengers. Passengers can “collect” and trade items and earn badges for certain commuting behaviors or from observation of surroundings en route or at the destination.*

Post-presentation Panel Evaluation and Feedback: UCLA Game Lab

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- The presenter displayed a good understanding of LA demographics.
- The presentation was fun and engaging – very wide-ranging.
- There are limitless possibilities to make the commute fun and a better customer experience.
- This is more social than financial but is still customer-based.
- While difficult to implement, this approach could be very rewarding for customers.
- It's notable that the gaming community is willing to contribute to the customer experience.
- This approach would require significant effort and a champion within Metro to bring the concept into practice.

Accenture

Mike Wilson with Accenture presented a comprehensive approach linking location-consistent contextual information and payment systems to the customer in a single tool. The emphasis of Accenture's approach is to incentivize behaviors that are mutually beneficial. It advocates open architecture, using proven, off-the-shelf technologies. MyRide with iBeacon functionality builds loyalty rewards into a flexible digital platform with offers adjacent to the customer's travel path. It rewards frequent usage, gathers information around customer preferences to optimize operations, and creates personalized rewards that increase revenue through expanded usage and connecting partners to customers. Gamification elements are designed to enhance the customer's experience and create community – a “network of friends”

Following the presentation the expert panel asked questions and provided feedback. Responses to questions are noted in italics.

- How would you approach implementing this in LA? – *We would first identify the most appropriate groups to talk to – agencies, merchants, industries.*
- What are some ideas for targeting off-peak travel? – *One example is bundling a pass with an event along with pre- and post-event local offerings. Another idea is a campaign for “healthy life Metro”, getting agencies to unlock information and show what demographics and needs are at what stop.*
- Platforms exist – the question is how to integrate them.

Post-presentation Panel Evaluation and Feedback: Accenture

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- This was an excellent presentation and demonstrated ability to integrate and use a platform that already exists
- He demonstrated actual or near-actual apps for a loyalty reward experience
- While the vendor has vast experience elsewhere the presentation didn't really explain how this might relate to LA Metro and the Metro service area -- one question is how this can relate to LA Metro and the Metro service area with its complexities
- It showed the importance of thinking about and including open systems integration and showing immediate results – this was a powerful message

- The focus was on the customer-centric model – rather than having the customer have to hunt for transportation options, bring them to the customer

Session 3 – Next-Gen Fare Systems

Key Themes

The three solution providers in this session were charged with presenting a 10-minute “pitch” on a solution that could simplify the fare payment process through technology, leading to increased customer understanding and satisfaction while at the same time maximizing fare revenue. Key themes emerging from the presentations and subsequent discussion were:

- Customers are expecting payment for the transit trip to be as easy and seamless as any other transaction – using a credit or debit card, a smart phone linked to a card or a “gift certificate” (pass).
- Transactions aboard transit vehicles have unique requirements for customer understanding, speed, security and transaction cost.
- Account-based systems that are operator (or retailer) specific have been the norm. Open systems (pay for anything with any medium) can have challenges in the transit environment, so the trend may be toward hybrid systems.

XEROX

David Corbin from XEROX presented on the challenges of current fare payment systems and how the Atlas real-time system responds to those challenges – “turning frustration into satisfaction”. He presented statistics on customer concerns and benefits of open payment (for example, 43% of passengers have experienced non-functioning ticket machines and 62% of agencies believe the true cost of fare collection is a minimum of 11%). The goal is to move from separate traveler accounts – bank card, transit card, mobile app, transponder, driver’s license – to a single real-time account management. He pointed out security, flexibility and operator benefits of having his company’s Atlas system, a single point for access with multiple inputs and real-time validation. The system can provide add-ons for purchase and use phone, bank card or identification card for access.

Following the presentation the expert panel asked questions and provided feedback. Responses to questions are noted in italics.

- How can fare integration between systems be improved? – *You have to determine shares (of fare revenue) but this can ease and simplify transfers.*

- What is the difference between open payment and open loop? – *Open loop can be used for multiple payments. Closed loop is usable on transit only.*
- How can a transit agency justify (bank/bank card) transaction costs? – *The transit agency achieves savings by speeding boarding, increasing ridership and reducing costs for cash processing.*

Post-presentation Panel Evaluation and Feedback: XEROX

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- It was a good presentation with a focus on open payment – a simple lesson on back office, account-based open payment system.
- This supports real-time fare payment to address fare difficulties.
- A question is how to use multiple methods of identification for payments
- Rules across access are key.
- Its all-in-one but the question is how to incorporate the Cubic API.
- Open is another way among others but need to create a layer to simplify.
- How can LA's challenges be addressed? There was no clear fare strategy in relation to the LA Metro situation.
- Need to describe open payment and open loop/closed loop terms.

Init

Thomas Wolf of Init described how open payment could help navigate the complex “jungle” of mobile payment options and discussed unique public transit needs for speed, security and understandability – for example, less than 500 millisecond transaction speed, diverse passenger attributes and no entry barriers, including acceptable transaction fees. He described how international experience is being applied in Portland, Oregon with account-based payment and fare capping (which eliminates the need for passengers to decide/pay in advance for a daily, weekly or monthly pass). The INIT validator, back office and payment service network function together to provide a seamless and confidential financial experience. In terms of the payment network, Mr. Wolf also advocated considering barcodes as another, established, medium.

Following the presentation the expert panel asked questions and provided feedback. Responses to questions are noted in italics.

- Does the mobile app described address ADA requirements? – *None has been built in yet.*

- How are fare capping challenges – such as loss of revenue – addressed? – *Portland assumes a slight loss but to balance this out, fare collection costs are lower.*
- Comment: Passenger trust is important when making a multi-system calculation of fare.

Post-presentation Panel Evaluation and Feedback: Init

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- The presentation was good but didn't delve very far into LA's challenges.
- A message is that the fare payment system can have a big impact on the operator's relationship with the customer.
- The customer will have to trust transit for the fare calculation, especially in a mixed transit environment.
- An advantage to the customer is to be able to provide "best price" through fare capping.
- Need more explanation on the full financial impact – for example, transaction fees vs. fare collection overhead savings and the impact of fare capping as opposed to standard passes.

Cubic

David Dekozan with Cubic presented the NextCity approach, which is designed to address the proliferation of paid transit systems with access to real-time information via multiple sources. Transit needs to tap into trends – banks are going contactless and mobile and customers from all walks of life are turning increasingly to smart phones. To assist in this transition, he described emerging, "hybrid" systems such as Chicago's Ventra, which combines existing transit media with open payment in an integrated application. As described, the approach is building on the NFC card as an application, with a secure, two-way transaction. Cubic's Next Wave provides a mobile connectivity platform that includes fare payment, travel information and a rewards program, all in one interface. The plan is to expand this to include other aspects of the travel and community experience.

Following the presentation the expert panel asked questions and provided feedback. Responses to questions are noted in italics.

- Does this link to a checking or other account? – *There are terminals at check cashing outlets, recognizing that this is a common place for lower-income customers to do financial transactions.*

- How does this work among operators who have different ways of proving payment? – *The Ventra system is transitioning from card to open payment but consumers are still using transit media (passes/tickets). CTA, PACE and Metra have developed an integrated application that provides real-time information and passengers buy a visual Metra ticket.*

Post-presentation Panel Evaluation and Feedback: Cubic

In written evaluations submitted after the sessions, the expert panel provided the following additional observations on the technology presented:

- The presentation was well-integrated with the LA environment.
- It addressed the challenges around mobile payment and diversity – of systems, environment, technical orientation of passengers.
- Incorporates use of existing media where possible.
- Variance in fare systems will be an issue.
- This is a way to bring a holistic transit experience.
- It's a great notion – having the same back office to integrate all kinds of transportation options with a hybrid combination of card-based, account based and open/closed loop payments.
- Account-based is the way to go.

CLOSING SESSION PANEL

As part of the closing session, one panelist from each of the three tracks of concurrent sessions shared their findings and insights as part of this final panel.



Mayor Garcetti addresses the audience during the closing session

Station of the Future

Gary Foster, CIO and Chief Technology Officer, Massachusetts Bay Transportation Authority provided the following insights:

- Concierge Services:
 - The station of the future should be layered, accessible and affordable for transit agencies.
 - Focus on the customer experience.
 - Leverage the many possibilities of “beacons” through signals and applications to improve service delivery.
 - Utilize services that are low-cost and low-maintenance.

- Employ wayfinding technologies for easy navigation of systems.
- Improve passenger and fare tracking capabilities.
- Virtual Agents/Kiosks
 - Address how to keep these technologies affordable.
 - Improve access and equity through these technologies.
 - Find the optimal scale and affordability level.
- Connectivity
 - Create stronger connectivity for fares, safety and data needs, and to create the bus of the future.
 - Consolidate connected systems; less is more.

Multi-Modal Integration

Tim McHugh, CIO, TriMet (Portland, OR) provided the following insights:

- Bike Sharing
 - Use systems that are flexible and open.
 - Explore how AB 118 could incentivize multi-modality, especially in support of social equity.
 - Integrate with transit, trip planning and other bike sharing systems.
- Car Sharing
 - Improve multi-trip linking capabilities.
 - Leverage it for its high level of complementary service to all other modes.
 - Study how NEV's could be effective for first/last mile.
- Autonomous Vehicles
 - Link to loyalty and reward programs for maximum value and use.
 - Solve the issue of where your car goes after dropping you.
 - Connect to enhanced system and trip planning.
 - Avoid planning too far ahead due to many unknowns: technology, parking, roadway capacity, and infrastructure.

Smart Trip Planning and Next-Gen Fare Payments

Anthony Iannucci, Head - Information Services, Toronto Transit Commission provided the following insights:

- Smart Trip Planning
 - Leverage the “gold mine” of data: options and choices.
 - Maximize systems' flexibility, agility and openness.
- Gamification/Loyalty Programs

- Focus on the experience, and make it fun: on the bus, and with other passengers.
- Develop rewards and points systems to engage users.
- Next-Gen Fares
 - Invest in real-time ticket/fare management systems.

Key Actions

Participants in the audience offered final thoughts regarding key actions for Metro's consideration in moving forward.

- Add more tools for customer information.
- Take an incremental and layered approach that builds momentum and provides a feedback loop.
- Utilize beacons to interact with customers.
- Conduct a demonstration project of the impact of free/cheap fares.
- Integrate trip planning for bike sharing and transit.
- Utilize the national information technology systems network.
- Improve projections for timed services.

APPENDIX A: WALL GRAPHICS

Photo-reduced wall graphics from the concurrent and closing sessions are displayed on the following pages.





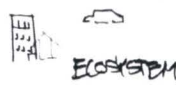
M METRO DIGITAL FUTURE
MULTI-MODAL INTEGRATION
AUTONOMOUS VEHICLES

Metopia

ACTIVE TRANSDMAND MGMT.

HOW CAN WE USE DATA?

- SAFETY?
- PERFORMANCE?
- EXPERIENCE?



THE PLATFORM

- IMPROVED EFFICIENCY
- INFO → DECISIONS
- REAL TIME DATA
- INCENTIVES
- LA, NYC, AUSTIN

LINK TO AUTON. VEHICLES?

SMARTPHONE & METROPIA IS THE "PEPIN"

PREDICTIVE OPTIMAL ROUTING & LOAD BALANCE

RESERVE VALIDATE

POINTS

- o DONATE
- o BUY
- o CREATE

OPTIMIZATION FOCUS?

TRAFFIC FLOW/ DELAY

BUSINESSES & INCENTIVES
→ DRIVE CUSTOMERS

ADDRESS POTENTIAL IMPACTS

- SPEED
- PARKING
- CAPACITY
- INFRASTRUCTURE

SELF DRIVING + SMART-TRIP PLANNING

2018 MANY SEMI-AUTONOMOUS

2023 MASS PRODUCED

2037

VALUE?

- SAFETY
- 30K LIVES SAVED

- COST 15% ↓
- INSURANCE
- SHARING

OPPORTUNITIES TRANSIT

DEALER EXPLORE OUTREACH

FIXED RAIL/BUS GUIDEWAYS

SHARED CONNECTED VEHICLES LAST MILE

DRONES: FACILITY MGMT. CONDITIONS & INSPECTIONS. FIRST RESPONSE

TOLLING: PHONE AS TRANSPONDER

TRUE CONGESTION REDUCTION? SUPPLY & DEMAND WILL ADJUST

VEHICLE AS ROLLING OFFICE? → COMMUTE BARRIERS

Accenture

WHY IMPORTANT? HOW? MULTI-MODAL CONCEPT ENLIVES

BEING IN LEVELS IN EXPANDING TECHNOLOGY

- ▷ BE SUPPORTIVE
- ▷ AVOID BARRIERS
- ▷ RECHALLENGES

M

25,000 SPACES BY 2016



NUMBER WILL AUTOMOBILES GO?

HOW ARE PARK HOURS MANAGED? → GUIDANCE SYSTEMS

UTILIZING FUTURE EXCESS SPACES?

CANNE CLOSED OR CHEAPEST SPACE?

POLICY NEEDS

- INFRASTRUCTURE
- SAFETY FEES
- INVESTMENT

CLEARER TO PARK OR CIRCLE?

POLICY ALSO PLAYS A ROLE

FOCUS ON SHORT STANDING TIME

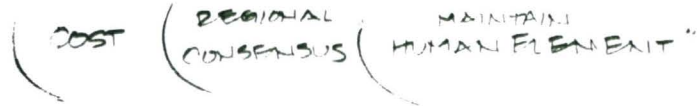
SHARED/INTEGRATED DATA → API AGREEMENT

INFLUENCE OF SHARING/ SUBSCRIPTION PROGRAM



TRACK 2

STATION OF THE FUTURE



SMART PHONE
 INTEGRATION
 VIRTUAL AGENT
 HOW TO CONSIDER
 PRIVACY?
 - CAN OPT OUT
 - APPLY STANDARDS

IS INFRASTRUCTURE
 SECURITY COMPROMISED

BAND WIDTH REQ'S
 FOR KIOSKS
 - USE OFF-PEAK TIMES
 TO DOWNLOAD DATA

HOW TO WORK W PUBLIC
 AGENCIES -
 - PARTNERSHIPS FOR
 PUBLIC SPACES

SCREENS ARE
 STILL NECESSARY

ADDRESSING
 MULTI MODAL OPTIONS

HOW TO ADDRESS
 DIVERSE AUDIENCES/USERS

VISITOR/TURIST POPULATION
 - ADVERTISING PROMOTION
 PREPARE USE OF PUBLIC FUNDS
 FOR ADVERTISING

HOW TO REACH TECH
 CHALLENGED POP
 - KIOSKS - ADVERTISE
 BUS SHELTERS

HOW TO PUBLIC AGENCIES
 CATCH UP TO TECHNOLOGY

HOW TO BALANCE
 ADVERTISING W PROVIDING
 SERVICE

"QUICK" ASSOCIATION
 - LEGIBILITY
 PEOPLE SPACE

HOW DO YOU ESTABLISH
 A "BRAND" FOR L.A.?
 - BUILD OFF OF METRO
 BRAND

MAINTENANCE
 HOW ARE COSTS MITIGATED?

VANDALISM
 LOCAL/PROGRAM MAINTENANCE

TRACK 2 SESSION B "STATION OF THE FUTURE"

CONCIERGE SVCE

HOW TO TAKE EXPERIENCE TO NEXT LEVEL
 WHAT ADDL INFRASTRUCTURE REQD
 LESS NEEDED
 PRACTICALITY OF REMOVING "GATES"
 INCREMENTAL
 HOW TO ADDRESS PRIVACY ISSUES
 TRANSPARENCY OF APPS LIABILITY?

SEAMLESS EXPERIENCE

ACCURACY FOR WAYFINDING
 - BEACON IDEAL ESP BELOW GRD.
 HOW TO REACH & BRIDGE GAP TO ADOPT
 NEED TO REACH ALL USERS PATRONS
 BEACONS CAN LIMIT USE BY DEVELOPERS
 ESTABLISH KEY TO ACCESS
 DIGITAL DIVIDE EQUITY PUBLIC AGENCIES
 HOW LONG TO CLOSE THE GAP
 CAN BEACON HANDLE VOLUME

ADDITIONAL ACCESS

HOW TO MAINTAIN BEACONS
 CENTRALIZE MGT.
 HOW DO YOU COORDINATE IN DIFFERENT SVCE PROVIDERS - DATA SETS
 ACCESS TO TRANSIT DATA
 SYSTEM-WIDE USE



TRACK 2

STATION OF THE FUTURE WIRELESS CONNECTIVITY

HOW LARGE
A NETWORK?

HOW DO YOU SUPPORT
PUBLIC VS PRIVATE
NETWORK

PUBLIC SAFETY
NETWORK COULD
BE OPP

WHAT COULD BE APPLIED
TO METRO?
MESH & PRIVATE

VEHICLE TO VEHICLE?
COULD BE REQ

BUSES AS MICRO CELL SITES?
OR ROW

PCI VS VLAN?
CAN ADDRESS
DIGITAL
DIVIDE
- MAPS
- PAPER
CARDS

SECURITY
- PARALLEL NETWORK
- PRIVATE NETWORKING
- GEOFENCING

4T → STATEMENT
CONVERSION
ADDRESSES RANGE
BELOW GRAND/BLDGS
COULD PUBLIC SAFETY
NETWORKS BE
LEVERAGED FOR TRANSIT/
PUBLIC AGENCIES

ANALYTICS OPP TO COLLECT
RIDER DATA
PUBLIC PRIVATE VALIDATE PASSENGER
COUNT SYSTEM
TO OFF SET
COST
COMBINE: OPP USAGE
ADVERTISING/MEDIA

CONSIDER BIZ MODEL
THAT FOCUSES ON MANUFACTURER

WHAT IS RELIABILITY RATE?
- BASED ON CARRIER

WHAT IS LIFE CYCLE
- HARDWARE - GOOD RATE
PLANS PROVIDE OPTIONS

TRACK 3- NEXT GEN TRIP / FARE SYSTEMS



SMART TRIP

STEER DRIVERS CLEARS

- 1. TIED IN INTO ACCESS MODES...
- 1. SOUND TRANSIT/ONE SMARTPHONE APP
- ↳ LOCATE/CONNECT W/ PEOPLE "ON THE MOVE"
- ↳ "LA 1" TRIP PLANNING/ACTIVITY PLANNING
- INCLUDES COMPENSATION + LINKS e.g. BIKE

? WHAT IF SYSTEM DOWN
 → PROVIDE OPTIONS TO RECONSIDER ROUTE

? MULTI-AGENCIES AS IN LA?
 - PREFER ONE AGENCY LEAD
 ↳ CROWDSOURCE DATA

CONTROL GROUP

- COLLABORATION ACROSS MODE CAR BIKE TRANSIT
- ▷ "PERSONALIZATION"
- ▷ MOBILITY MK
- ? HOW TO CALCULATE COST
 - ↳ HAVE "OPEN LOOP" PAYMENT ACROSS MODES
- ? APPROACH OF CONTROL GROUP
 - ANALYZE USER NEEDS
 - EMPLOY "DESIGN LAB"
 - 1. IDENTIFY UNIQUE CUSTOMER "PERSONAS" TO RECHARGE SERVE!!

OPENING PANEL

- ? HOW DO WE ADDRESS EQUITY ISSUES?
 - ↳ IMPROVE ACCESS
 - ↳ CONTINUE CASH PAYMENT

GIRO

- ▷ LINK TO PARATRANSIT SERVICES - A VIABLE OPTION!!
- ▷ PERSONALIZED DOOR-TO-DOOR!!
- ▷ ALWAYS ON, ALWAYS CONNECTED
- ▷ OPEN SYSTEM /

→ NEXT STEP?
 - HYBRID APP

→ BENEFIT TO IPT ON

WEB-IDENTIFY IN-PERSON "MEET"

LOCATION

CHALLENGE = TAXI INTERACTION
 ADDRESS COMPATIBILITY/USE THRU BIZ PROCESSORS/CONTRACTS

? INTERFACE:

GOOGLE INTERFACE SIMPLER THAN APTA/PTD

TRACK 3 - GAMIFICATION / LOYALTY

S&P

- STU/MONTREAL
 - EMPHASIZE INNOVATION
 - LOYALTY = RECOGNITION + REWARD
- USE OPAL CARD PURCHASING HISTORY
 - GEO-LOCATED OPTIONS
 - SELF-LEARNING ENGINE
 - CREATE MICRO-COMMUNITY
 - FOCUS ON LOCAL
- SYNERGY → ↑ OFF-PEAK USE → ↑ SPENDING
- KEY: GATHER INTERNAL IDEAS TEAM PULL BEST RESOURCES

UCL & GAME LAB

- APPLYING GAMING = CUSTOMER EXPERIENCE VS BUSINESS/REVENUE
- EMERGES AS PART OF METRO - MULTIPLE DEVELOPERS
- ? HOW DOES IT APPLY HERE?
- GAME LAB CAN BE AT THE TABLE DISCUS STATE OF GAMING
- ↑ RIDERSHIP → ↑ CUSTOMER EXPERIENCE
- TECH INTO OTHER PHYSICAL LOCATIONS
 - ACCELEROMETER ON PHONE
 - TRAIN/BUS SPEED GAMES
 - "COLLECTING/ TRADING ITEMS"
 - CREATE COMMUNITIES

ACCENTURE

- MOVE FROM OPERATOR-CENTRIC TO CUSTOMER-CENTRIC MODEL
- OPEN ARCHITECTURE / COTS COMPONENTS
 - USE PROVEN OFF-SHELF TECHNOLOGIES
 - CHOICE
- LOYALTY REWARDS - FLEXIBLE DIGITAL PLATFORM
 - WHERE FEELS IN RANGE
 - PROXIMITY SERVICES / OFFERS
- GAMIFICATION - CREATE COMMUNITY / "NETWORK OF FRIENDS"
- ? IN L.A.?
- IDENTIFY WHO WE TALK TO
- TARGETING OFF-PEAK
 - BUNDLE PASSES w/ EVENT
- PATTERNS EXIST - Q IS HOW TO INTERSECT
- COMPASSION F "HEALTHY LIFE METRIC"
 - SCENARIOS UNLOCK INTO
 - SHOW WHAT DEMOGRAPHICS @ WHAT STOP /

TRACK 3 / SESSION 3 - NEXT GEN FARE SYSTEMS

MOBILE PAYMENT: PAY W/ MOBILE PHONE OPEN PAYMENT: USE IN A MEDIUM

XEROX COPY

INIT

CUBIC

- TURNING FRUSTRATION INTO SATISFACTION:
 - INTRODUCE IN PORTLAND, OR
 - ACCOUNT-BASED USE
 - PORTLAND PAYMENT
 - FARE CAPPING
 - NOT REDEEMABLE, ONLY IN ADVANCE - NO PASSES
 - FARE ACCREGATION
 - FARE CAPPING
 - COLLECTOR: TATS // INVOICE
 - FEEL
 - CONFUSING JUNGLE OF MOBILE PAY - app pay, google wallet
 - CHALLENGE OF TRANS - SPECIFIC CHALLENGES
 - CONTRADICTORY NEED FOR SPEED
 - SECURITY OFFENSE
 - BUSINESS RULES
 - NEED SIMPLICITY
 - FARE SYSTEM W/ TANGIBLE CO-SIDE BRIDGE - GEORGE WAGNER (REDUX)
 - MOBILE APP; ADDS REQ'S - NONE BUILT YET
 - FARE CAPPING CHALLENGES
 - LOSS OF REVENUE
 - PORTLAND ASSUMES SHORT LOSS BUT FARE COLL. COST LESS
 - PASSHOLDER TRUST MULTI-SYSTEM CALCULATION
- FARE: SEPARATE TRANSECT ACCTS. ANSWER: SINGLE POINT W/ MULT INPUTS
- REAL-TIME VALIDATION VERIFIES + TANGIBLE ADD-ON PURCHASE + CAN USE PHONE, CARD, ID
- ACCOUNT-BASED: ANXIETY, FLEXIBILITY SHARED FAMILY, EMPLOYEE NEEDS
- IMPROVE INTEGRATION BTR. SYSTEMS - HOW TO PERFORMING SHARES BUT CAN BASE / SIMPLIFY TRANSECTORS
- OPEN PAYMENT / OPEN LOOP?
 - OPEN LOOP USED ON MULTIPLE THROUGH CLOSED LOOP = TRANSIT ONLY
 - COSTS - HOW TO JUSTIFY TRANSECT COST
 - SAVINGS F/ SPEEDING BOARDING / LESS CHAIN PROCESSING
- REAL-TIME VALIDATION VERIFIES + TANGIBLE ADD-ON PURCHASE + CAN USE PHONE, CARD, ID
- ACCOUNT-BASED: ANXIETY, FLEXIBILITY SHARED FAMILY, EMPLOYEE NEEDS
- IMPROVE INTEGRATION BTR. SYSTEMS - HOW TO PERFORMING SHARES BUT CAN BASE / SIMPLIFY TRANSECTORS
- OPEN PAYMENT / OPEN LOOP?
 - OPEN LOOP USED ON MULTIPLE THROUGH CLOSED LOOP = TRANSIT ONLY
 - COSTS - HOW TO JUSTIFY TRANSECT COST
 - SAVINGS F/ SPEEDING BOARDING / LESS CHAIN PROCESSING
- VISION: ACCESS TO REAL-TIME INFO/MAKE PAY VIA MULTIPLE SOURCES
- FARE - TRANSITION F/ ACCOUNT-BASED SYSTEM TO OPEN SYSTEM
- EMERGING HYBRID SYSTEMS
- CHICAGO VENTRA F/ CARD TO OPEN PAYMENT
- BANKS BETTING ON SMART PHONES // google pay
- TRANSIT FARE NEXT APP
- REAL-TIME COMMUNICATIONS
- NEWLY NFC CARD AS APP
- TRANSACTION IS 2-WAY
- NEEDS TO BE SECURE
- CAN INTEGRATE PASSENGER INFO/REWARDS
- LINK TO CHECKING ACCOUNT OR OTHER ACCT.
- HAVE TERMINALS
- CHECK CASHING OUTLETS
- EACH ISSUE - LONG TIME BUT IMPROVING
- BENEFIT OF BACK OFFICE = CAN FIND ALL OUT OF BACK OFFICE
- CONSUMERS STILL USING TRANSIT MEDIA
- OTA TRACE + METRICS
- INTEGRATED APP
- VENTRA + REAL-TIME INFO + BUY METRA
- METRA TICKET

M METRO: DIGITAL FUTURE CLOSING SESSION ON NOVEMBER 7, 2014

