California Integrated Travel Project

Phase 2 Report

September 2018

Cal-ITP
California Integrated Travel Project

Contents

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California State Transportation Agency
Caltrans
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Executive Summary

California's recently approved 2018 State Rail Plan highlights the need to deliver seamless travel across multiple modes – interconnecting rail, metro, bus and private mobility providers – on a single ticket, with the aim of making public transportation easier, quicker, and more attractive to use that ever before. In the context of recent challenges to growth in public transit ridership and in light of the many changes in the way people are using new mobility choices to handle their transportation needs, the need for integration among operators and across modes is even more apparent.

Multimodal journey planning and ticketing is important to facilitate sustainable mobility and travel for citizens and visitors, promote a shift towards the use of public transport, and foster improved integration of the available modes.

The California State Transportation Agency (CalSTA), in conjunction with Caltrans, the Capitol Corridor Joint Powers Authority (CCJPA), and local, regional and state partners, has begun an integrated travel project (Cal-ITP) to research, plan and establish a statewide framework for multimodal transport interoperability. A major activity of this effort is the launch of a multi-year trial of a travel planning and and payment pilot including small, medium and large agencies, and private providers. The project will link California's intercity passenger rail corridors with megaregional, urban and rural operators, delivering new connectivity options to encourage use while ensuring best value for travelers. Other integration efforts related to development of better scheduled connections and development of new services that fill public transportation network gaps are also underway, primarily through a large number of network integration efforts connected to grants from the Transit and Intercity Rail Capital Program (TIRCP).

Although until recently uncommon in the United States, the concept of integrated travel is not new; there have been successful implementations of multimodal trip planning and payments around the world including Hong Kong, Taiwan, Japan, Korea, Scandinavia, the Netherlands, Switzerland and the United Kingdom. In 2017, early work conducted for Cal-ITP (referred to as *Phase 1*) examined many of these implementations to understand their key drivers; policies and processes for political and technical execution, and to identify a set of recommended best practices for California. Key themes that emerged from the Cal-ITP Phase 1 research included the criticality of policy, governance, inter-agency agreements, harmonized standards, and open data. In more recent years, consumer adoption of smartphones has driven a move to mobile-based trip planning and payments for many users, while mobility-as-a-service (MaaS) providers have introduced travel alternatives that in many cases complement public transit for provision of first and last mile services. In almost all cases, successful integrated travel initiatives have been coordinated and driven by the State or regional federation, with varying levels of voluntary and mandatory participation by regional and local public transportation operators depending on the country.

With the completion of the initial phase and recommendations for next steps, CalSTA authorized a second Cal-ITP phase that established a formal Steering Committee and Advisory Board of industry experts to guide the Cal-ITP effort, with a focus on obtaining feedback from a wide range of California transit stakeholders so that efforts to pilot elements of integrated travel could reflect California-specific needs and requirements. A conference was planned for May 2018 that would bring together key stakeholders from state agencies, regional and local transport operators, shared mode providers, and the academic and business communities. The event offered participants an opportunity to learn more about integrated travel concepts, ask questions of leading European and North American agencies who have deployed multimodal travel planning and payment platforms, and provide opinion and help shape progress on a statewide solution for

California. With more than 200 attendees and speakers participating over a two-day agenda comprising ten hours of keynotes, session and panels, the conference received a 92% approval rating. It provided an opportunity for CalSTA and its partners to frame the discussion of an innovative opportunity to improve the travel experience throughout California, while offering a chance for input from a wide audience within the state's transportation community.

When polled, 78% of conference attendees who responded were 'very sure' that California transportation agencies should work collaboratively on a framework for statewide integrated trip planning and fare payment.

The second phase of Cal-ITP is now concluded, and a third phase is planned to commence in late 2018 utilizing TIRCP funding that will allow a multi-agency pilot of integrated travel planning and fare payment.

This report draws from the feedback received to date and provides the following key recommendations for possible next steps to be addressed during the development of the pilot:

- Define the Role of the Cal-ITP Steering Committee
- Establish an Interim Managing Entity
- Create a Program Management Office
- Develop a Business Case and Business Plan for Integrated Travel
- Develop an Approach for California Mobility Data and Related Policies
- Plan an Integrated Travel Pilot

Cal-ITP Steering Committee
Sacramento, California
September 2018


RIVERSIDE DOWN
675

Introduction

As work on the 2018 California State Rail Plan began to receive wide-ranging stakeholder input in 2015 and 2016, the need for customer-focused improvements that would allow for seamless, integrated mobility became an early part of the consensus vision for the plan. Both transportation policy organizations and operators identified integrated ticketing and better connectivity as essential to future ridership growth and competitiveness of public transportation.

In 2016 some of the state's early recipients of Transit and Intercity Rail Capital Program (TIRCP) funding expressed a desire to better integrate key elements of the transportation system. The LOSSAN Rail Corridor Agency (managing agency for the Amtrak Pacific Surfliner service) had expressed an interest in better integrated rail schedules and services in their services area among the multiple rail operators, and also an interest in offering a transit transfer program so that riders could continue their journey at free or discounted rates on participating transit services. Metrolink was working on mobile ticketing and the ability to offer seamless travel even on the gated parts of the Los Angeles MetroRail system. And the Capitol Corridor Joint Powers Authority (CCJPA) expressed an interest in both developing a timetable with optimized connections and in identifying the best way to modernize its approach to mobile ticketing and transit transfers.

The Cal-ITP effort emerged in this context. Growing out of the CCJPA integration project that focused on improving mobile ticketing and transit transfers, there was an opportunity to conduct focused research on integration efforts in Europe during a week of meetings and interviews. The results of that work were documented and shared with Caltrans, CalSTA, the state intercity rail operators and a number of stakeholders in the CCJPA in the fall of 2017, and is now referred to as Phase 1 of the Cal-ITP.

When this research was seen to dovetail well with the themes that were also present in the Draft 2018 California State Rail Plan, the agencies that had reviewed the research identified the need to receive broader input on the concepts so that what appeared so interesting in the European context could be properly interpreted in a California context. In late 2017, Caltrans provided supplemental funding for CCJPA for Cal-ITP Phase 2 to facilitate a multi-agency initiative to research the viability of enabling California residents and visitors to use a mobility solution to plan and pay for travel anywhere in the State across multiple modes of intercity and regional transportation including bus, metro, commuter and intercity rail, and private/shared modes. A key element of that research was determined to be a conference in which feedback would be received on the research and concepts developed to date. That conference was conducted on May 1-2, 2018 at UC Davis, and this Phase 2 Report summarizes the event findings.

In the span of a decade the proliferation of smart phones and the apps developed for them have rapidly altered the concept of mobility and how it can be consumed and delivered as a product.

Describing all aspects of publicly accessible transportation in 2018 is very different from 2008. In the span of a decade the proliferation of smart phones and the apps developed for them have rapidly altered the concept of mobility and how it can be consumed and delivered as a product. In addition, significant changes have occurred in the attractiveness of conducting small transactions related to public transportation with electronic payment, leading credit card institutions to develop new global standards to support such transactions. Finally, a number of systems around the world, including in the United States, have developed methods of speeding transit boarding by transitioning to cashless payments on their transit vehicles through the use of smart cards (that can be loaded with cash off-vehicle) and mobile devices.

It is now time to take stock of the changes. As transportation providers adapt, many lessons can be learned from those who have already been through the transitions noted above, allowing best practices to be observed and incorporated in cost-effective investments that improve the customer experience.

A common need related to most efforts to offer integrated, seamless mobility is a framework for how to handle data. This data is not just needed for public transportation operators. It is also needed by many of the private companies that are investing in complementary transportation services, by autonomous vehicle developers and to better manage the public assets that are shared by these users, such as curbs, parking spaces, and the hubs and nodes at which connectivity among systems and services is provided. Developing data accessible to public and private users is a significant enabler of improved and safer mobility; integrated ticketing and travel planning is just one beneficiary of it.

Developing data accessible to public and private users is a significant enabler of improved and safer mobility.

But what use is data that is collected one way by one transit agency, another way by each city, and yet another way by scores of private and shared mode providers? If data systems are allowed to interact according to standards with a system of interconnected, interacting data points, mobility will be less constrained, and travelers will have many more ways to plan and then pay for their journey. The efforts of Cal-ITP through Phase 2 point to the value of organizing data to support network mobility regardless of the mobility provider, and to ensure data is organized at a governance level with a degree of neutrality that can allow a level playing field for public and private operators to participate as a networked mobility system.

This Phase 2 report summarizes the event findings, concludes the phase, and recommends potential next steps for a third phase. For this publication, we focus on the conference primarily and provide a summary of Phase 1 findings for reference in Appendix A.

Background

Challenges of Growth

California is now the world's fifth largest economy[1] with an effective gross domestic product of $2.74 trillion – up 3.4% in the last 12 months – and a population of nearly 40 million people, expected to rise to 48 million by 2040[2]. As part of the California Transportation Plan 2040 and related documents such as the 2018 California State Rail Plan, California and its various regions have a vision to expand the rail and public transportation system to address population increase, provide competitive alternatives to personal vehicle use, ease traffic congestion, and lower greenhouse gas emissions. California has at least 269 local agencies in more than 100 public transit districts, which serve individual cities, entire counties, or regions with publicly-funded transportation services[3]. However, it is a disaggregated transportation system that is difficult to use for many travel purposes, with relatively high costs and recently declining ridership. At the same time, technology innovations are already available that can make travel simple and more reliable, and the popularity of private mobility companies is on the rise. While individual public transportation and planning agencies have taken significant steps towards coordinating service and modernizing some aspects of travel such as fare payment and wayfinding, there are additional improvements to be made in California.

California has a disaggregated transportation system that is difficult to use for many travel purposes, with relatively high costs and recently declining ridership.

Mobility in Flux

With over $35 billion in state and local government spending in 2017[4], California spends more money on public transportation than any other state in the country. While there are many travel options, there are also many barriers to travelling seamlessly where, when, and how people want to move. About 5.3% of Californians commute to work by public transit, which equates to millions of people each year[5]. 80% of Americans support use of their tax dollars for creating, expanding, and improving public transportation in their community[6], yet ridership on many mass transit systems is in decline in recent years. Between 2012 and 2016 California lost 62.2 million annual transit rides[7].

Researchers across the nation and in California have been trying to better understand the significant flux they are observing in the use of public transportation. Compared to past trends, which have shown transit ridership declines most often during periods of economic downturn, the last few years have shown declines during a period of continued economic growth. Other factors may be having an effect on inefficiencies in public transit such as supply and costs of housing, automobile and gas prices and improved access to driver's licenses within the state.

Public transit agencies should see the challenge of declining ridership as an opportunity for change

The Eno Center for Transportation suggests that public transit agencies should see the challenge of declining ridership as an opportunity for change. Californians who rarely ride transit represent great untapped potential, as do visitors to the state for whom public transit currently presents a complex system to navigate. Emerging and easily accessible modes of transportation, such as ride hailing, bike and car share, have been

1 U.S. Bureau of Economic Analysis, May 2018 http://bit.ly/2zVXGW6
2 California Department of Finance, March 2017 http://bit.ly/2zVGyQI
3 California Statewide Strategic Plan 2017 http://www.dot.ca.gov/drmt/spstsp.html
4 Usgovernmentspending.com http://bit.ly/2mxZ9bD
5 Public Transit in California, California Energy Commission http://bit.ly/2EksWvO
6 Mineta Transport Institute study for APTA, July 2018 http://bit.ly/2OohOmP
7 UCLA Institute of Transportation Studies, January 2018 http://bit.ly/2Ei8zPN

shown to offer important first/last mile connections, and present an opportunity to increase public transit use[8]. Yet while innovative transport modes continue their growth, they are often not united with public transit as an interconnected system that residents and visitors can use to travel more easily and simply throughout the state. Rail and transit have the ability to reverse many of these declines and play a larger role in serving California's mobility needs in the future, but seamless, integrated mobility across public and private providers will play a critical role if this is to be achieved. Integrated ticketing and travel planning will play an important role in this effort.

Policy & Governance for Change

California's growing economy and population will bring increased demand for mobility as it continues to rapidly transform, along with pressure to expand the efficiency and capacity of the transportation system. Making the best use of each mode – including rail, bus, metro, and transportation network companies (TNCs) – and creating interconnections among them are key to meeting that demand[9]. However, a true statewide multimodal system does not yet exist in California, and no statewide effort has yet taken place to stitch together these modes to enable them to be experienced as part of a connected system and thus more accessible to travelers. Understandably, regional transit agencies have historically been focused on improving services and increasing ridership in their local areas, rather than the bigger picture of connecting metropolitan regions effectively and efficiently through the use of harmonized timetables, wayfinding, and payment methods. A multi-regional, statewide approach has the opportunity to bring the advantages of unified technical tactics and economies of scale.

The 2018 California State Rail Plan[10] establishes a statewide vision that, as one of its primary goals, will improve multimodal mobility and passenger service for everyone. The plan calls for coordinated and convenient transfers between rail and transit and seeks to integrate private/shared mode services for a more reliable, door-to-door travel experience. Furthermore, it plans to enable people to plan an entire, seamless trip using a single ticket valid across multiple providers within the first 5-10 years of the plan. By 2040, interregional travel in the state across all modes is forecasted to increase by 50.9% to 544.7 million trips annually, and rail and transit will be used for a significant portion of that travel. By then Californians must have access to a harmonized, state-of-the-art transportation system that will revolutionize personal mobility and enhance quality of life. To achieve this goal, steps should be taken now to stand up the policy, governance and technical frameworks for journey planning and payment across multiple modes.

There is a significant opportunity to create such a statewide framework for multimodal interoperability with regional operators and the State working in close cooperation to improve the efficiency and appeal of public transportation and private/shared modes to increase the ease by which people can plan and pay for their travel anywhere in California, while lowering costs for both the operator and consumer.

Cal-ITP does not seek to replace existing trip planning, fare policy or payment systems, but rather to advance efficiency by providing unified standards for mobility elements such as planning and payment, that will enable a more seamless experience for travelers even while the notion of mobility undergoes even more change. Transit operators, private operators, third parties and vendors can be empowered with tools to increase integration of planning and payment locally, regionally and statewide; decrease fare collection costs; and capture new customers.

Innovation Offers Opportunity

California's public transportation community now has an opportunity to change the way travelers make transportation choices in the state. Transit operators can harness the opportunities of this new inter-connected mobility frontier by partnering to define the policies and approaches to integrated travel that will bring together existing and emerging transportation options to grow ridership and accommodate more riders in the system, deliver service more effectively and with better consumer value, and leverage new technology and open standards for mobility data that benefit all.

Precedent set by European and Asian transportation agencies suggests that use of a harmonized payment mechanism makes mass transit services easier and more convenient for customers to use, by eliminating the need for familiarity with multiple complex fare products, while also cutting transport agencies' costs of fare collection. These agencies have built business cases around the investments they have made in integrated travel solutions that have then been tracked, with results showing significant reductions in the cost of collecting fares and distributing revenues to customers (often by close to or greater than 50%).

8 Unraveling the Modal Impact of Bikesharing', Shaheen, Susan & Martin, Elliot http://bit.ly/2nRQfqy

9 'Connecting Planes, Trains and Automobiles', Kanafani, 2008

10 California State Rail Plan http://www.dot.ca.gov/californiarail/

One opportunity to reduce costs and increase ridership is found in the 77% of the U.S. adult population who own a smart phone[11], and the likelihood that a higher percentage will own them in the future. People now expect the convenience and immediacy of mobile technology to be applied to the travel experience. These devices are increasingly popular for planning and paying for travel on all modes of transportation, as well as driving uptake of emerging mobility-as-a-service (MaaS) schemes. With the proper policies and mechanisms in place, it is possible to develop and implement a statewide trip planning and fare payment platform that will enable California residents, visitors and tourists to use their mobile phones to plan and pay for trips across inter-city and commuter rail, light rail, bus, microtransit[12], bike-share, ride-hailing and other emerging private/shared mode services.

But smart phones are not the only tool, and many systems have found great value in pursuing other solutions that include use of credit cards and improved smart cards for these efficiencies as well. A statewide trip planning and fare payment platform need not replace existing regional payment media, such as smart cards and cash, but would work alongside them to offer alternative, more far-reaching and useful solutions while also working to deliver value from integration to all users regardless of whether they have access to a smart phone or not.

Underwritten by a potential state and regional partnership, smaller transit agencies could leverage the platform to bring travel planning and mobile payments to their customers without the capital investment currently required to deploy an agency-specific solution.

The system would help drive ridership by attracting new customers who had previously used other modes for a particular trip, and would also make it more likely that travelers would consider using public transit for interregional travel which is less likely today due to the difficulty of planning and purchasing such journeys.

In addition to coordination among government entities, innovative partnerships will be needed to integrate transportation services with private entities. Such partnerships would include organization with private-sector providers of non-rail connecting services – such as rideshare operators, and private bus operators including microtransit – to provide integrated fares and harmonized schedules to elevate those services and increase utility and value to passengers.

The challenges to successfully executing a program of this magnitude are substantial, as evidenced by similar programs in European and Asia Pacific regions, but so are the consequences of inaction. It requires collaboration and collective problem solving at all levels of state and local government; with public and private operators; academia and think tanks; and with vendors of appropriate technologies. The dialogue has already begun to inform the best political and technical approach for California to realize the full social and economic potential of integrated travel in the state, and to create a more resilient, sustainable and connected California.

11 Pew Research Center, February 2018 http://pewrsr.ch/2nYqhRb

12 Shared Mobility Definitions, FTA http://bit.ly/2nZHbz1

Phase 2 California Engagement

In October 2017, CalSTA authorized the continuation of Cal-ITP for a second phase under the direction of the Capitol Corridor Joint Powers Authority (CCJPA). Between October and December 2017, Cal-ITP focused on the tasks including the development of an online project management system and information repository; attending transport industry events in the U.S. and Europe; meeting with additional PTOs (including TriMet in Portland, OR) and vendors of ticketing and travel planning technologies; and the preliminary planning of an Integrated Travel conference to be held in May 2018.

Steering Committee & Advisory Board

In December 2017, CalSTA and its partners created a Steering Committee (SC) to provide Cal-ITP with oversight and more formal direction. The SC met on a weekly basis by phone to assess progress and status, review financial status, and make decisions regarding next steps and issue resolution. This was followed in January 2018 by the creation of an Advisory Board comprising leading experts in the transportation industry – drawing on transit operators, academics, and industry advocate groups – which convened monthly and helped shape the agenda of the Integrated Travel conference. The members of these groups are listed in Appendix B.

Long Term Project Funding

In February 2018, CCJPA applied for State funds totaling over $27m for a five-year Cal-ITP effort.

Initial funding for the Integrated Travel Project was provided by CCJPA and Caltrans and this has covered phases 1 and 2 presented in the table below. In February 2018 an opportunity arose for CCJPA to apply for funding for Cal-ITP through the California Transit and Intercity Rail Capital Program (TIRCP[1]), a multi-year program providing funding for projects aimed at reducing greenhouse gas emissions and creating jobs by expanding transit and rail options that are faster, more frequent, and more reliable. Pursuant to continuing Cal-ITP beyond Phase 2, CCJPA applied for long term Cal-ITP funding totaling $27.34 million over five years encompassing two additional phases as follows:

Phase	Activity	Duration	Status
Phase 1	Research of European integrated travel schemes & report to CalSTA.	6 months	Completed in September 2017
Phase 2	Research of California PTO travel planning & payments, organization of conference to solicit feedback from participating entities, report to CalSTA with recommendations for Phase 3.	9 months	To complete in September 2018
Phase 3	Development of pilot program with intercity rail operators and selected PTOs and private entities.	Up to 2 years	Expected to commence November 2018
Phase 4	Implementation of pilot program with option for inclusion of additional participants, report to CalSTA on pilot outcome and recommendations for wider deployment.	Up to 3 years	Activities may begin concurrently with the latter stages of Phase 3, and continue for up to 3 years beyond its completion.

1 http://www.dot.ca.gov/drmt/sptircp.html

Phase 3 is the development of a pilot project with selected public and private transportation operators and, upon approval of the Phase 2 report, is expected to commence in late 2018 and last up to two years. The final phase is the implementation of the pilot with the option for inclusion of additional participants for three years, and at the end of Phase 4 report back to CalSTA on the pilot outcome with recommendations for wider deployment.

CCJPA was among 40 entities statewide that applied for TIRCP funding and was one of 28 that received a share of the program's total $2.6 billion made possible through Senate Bill 1 (SB 1), as well as proceeds from the Cap and Trade program[2]. The Cal-ITP initiative's Phases 3 and 4 were funded in full by CalSTA in April 2018[3]. CCJPA believes the investment will lead to significant improvements in ridership, efficiency, and connectivity on rail and transit systems across California. These ticketing and travel planning activities for Cal-ITP will be developed with a framework that allows for rapid expansion following the pilot program to interested public and private sector partners[4].

Integrated Travel Conference

Purpose & Objectives

California has the opportunity to come together across state, regional and local stakeholders with the vision, policies, and funding to invest in travel integration. To address the urgency of the situation and these exciting opportunities, a two-day conference event was held in May 2018 with the intention of offering participants an opportunity to learn more about integrated travel concepts, ask questions, and provide opinion on a statewide integrated travel initiative, with a view to helping shape progress in the next phases of Cal-ITP. Key objectives of the event included:

- Sharing the vision of a statewide integrated travel program and defining what it means to integrate travel for a uniquely Californian initiative;
- Introducing the concept of a unified travel planning and payment mechanism for California;
- Imparting the urgency of the situation and immediate need to act;
- Establishing the State's commitment (e.g. funding, policy and other resources) to support an ITP initiative and pilot program for California Intercity Rail JPAs and other interested operators to be determined (the award of funding for the effort through the TIRCP had just been announced a few days earlier);
- Presenting case studies of successful deployments in Europe, Asia and North America and learning how state agencies overcame obstacles to set up managing entities; develop policies and agreements with national and local operators; implement standards and processes for fare, timetable and real-time travel data exchange; develop mobile applications for trip planning and e-ticketing; and create a scalable back office platform for management of the system as a whole;
- Encouraging dialogue and discussion with the audience through a series of panels, Q&A sessions, an interactive workshop, and understand what we collectively need to agree on to make integrated travel in California a reality;
- Collecting feedback from attendees that will help assess the viability of, and procedure for, moving forward with a limited trial of an integrated travel program with a number of selected agencies;
- Hosting a Transportation Camp at the conclusion of the conference that builds from the conference subject matter and insights and provides additional contribution to the program's development and objectives.

Venue & Participants

The conference took place at the University of California Activities & Recreation Center (ARC) in Davis, CA on Tuesday May 1 and Wednesday May 2, 2018, and was hosted by CalSTA in collaboration with Caltrans and CCJPA. The event was financially and organizationally supported by sponsors including Facebook, Ford Mobility, the National Center for Sustainable Transportation, UC Davis Institute of Transportation Studies, CalACT, California Transit Association, Arup, Deutsche Bahn, SPUR, the Metropolitan Transportation Commission, and NACTO. In late February 2018 a total of 353 people within the California transportation industry were invited to save the date for the inaugural event.

A total of 203 invitees and speakers participated in the two-day event (representing 57.5% of those originally notified), mixing representatives of state-funded public transportation operators and agencies, academia, transportation network companies, other government agencies, consulting firms, selected solution vendor representatives, and other parties identified by the Steering and Advisory Committees.

32% of participants represented California state agencies, while 26% were public transportation operators and 4% private transportation operators. 11% classed themselves as transportation consultants, 11% as solution vendors, and 4% as academics. The full list of attendee names and affiliations is included in Appendix C.

2 CCJPA Press Release, April 2018 http://bit.ly/2A44Ozz
3 CalSTA TIRCP Project Detail Summary, April 2018 http://bit.ly/2uXtmVm
4 See *Phase 2 Recommendations* for more detail.


To North Hollywood
/Metrolink/Amtrak
To Wilshire/Western
To Union Station

Format & Agenda

The two-day agenda could be roughly defined as an examination of the themes resulting from the Phase 1 report from a perspective outside the United States on Day 1, and a discussion of topics and best practices for implementation in California on Day 2. An initial suggested agenda defining topics and potential speakers was drafted and then developed by the Steering Committee and Advisory Group to ensure that all stakeholders had input to the agenda, flow and desired outcomes. The following table shows the event format:

Day 1 – Tuesday May 1	
Keynotes	Introductions by CalSTA representatives and others outlining the event background, purpose and objectives.
Sessions & Panels	Three short perspectives, seven sessions and two panels comprising selected U.S. and European case studies that touch on the key themes that emerged from the European study.
Day 2 – Wednesday May 2	
Keynotes	Speeches by key representatives of California state legislature and selected PTOs.
Sessions & Panels	Eight sessions and two panels comprising U.S. case studies and focus by subject matter experts on challenges, approaches and best practices for implementation of integrated travel in California.
Closing Q&A	Final panel session with the Cal-ITP Steering Committee with event summary, audience Q&A, and next steps.
Workshop	Afternoon Transportation Camp workshop for deeper exploration of specific themes and topics.

The final conference agenda is included in Appendix D.

Note on Presentation Summaries

All comments by speakers, participants and presenters summarized in this report are their own experience and opinion provided only for education and discussion by the audience and are in not specifically endorsed by Cal-ITP or any of its partners, nor do they represent official positions of the companies or organizations that they represent.

Day 1 Synopsis

The roughly five-hour agenda for the first day of the conference had two purposes. First, to enable CalSTA to present the objectives of the event, hear the perspectives of three California transit operators, and to understand the benefits and opportunities of an integrated travel system. Second, the conference presented the opportunity to hear from a selection of European entities who have implemented solutions to integrate modes using a single payment mechanism and, in some cases, travel planning.

Introductions

Following the opening introduction from Kate White of CalSTA, Professor Dan Sperling welcomed the audience with a reminder that much has changed in public transportation and very rapidly – particularly in sharing, automation and electrification. Professor Sperling envisages a single payment mechanism across all modes. He believes the challenges to this goal are institutional and financial, not technological, and that the industry needs to embrace innovation and collaboration.

Brian Annis, California Secretary of Transportation, reminded the audience that California is at a point where investment in public transportation must be strategically coordinated to address the historical shift away from transit use. He highlighted 2017's Senate Bill 1 (SB1) as example of this effort to fund new initiatives, improve the state of transportation, meet California's environmental objectives, and make the lives of all Californians better. Over $7 billion in grants will help fund over 200 miles of rail extensions, 300 new zero emission buses, and over 500 new rail vehicles. The conference, he said, was about leveraging state funding to start a mission for the better integration of transport in the State.

Chad Edison, Deputy Secretary of Transportation, said the future of transportation in California was all about better serving the needs of travelers so they can live their lives more freely and more productively. This means providing on-time, reliable, safe and affordable service that gets customers where they want to go with as little stress and as enjoyably as possible. Boundaries between service providers must be invisible and not lead to slow and difficult travel, requiring a level of integration that has been achieved in other places around the world but not yet fully in California. The purpose of the conference is to explore these opportunities. Mr. Edison encouraged feedback and support to create value, increase ridership and lower costs across California.

Grace Crunican, General Manager, Bay Area Rapid Transit

Grace Crunican stated that BART has an open data policy and is well-engaged with mobile apps to improve customer experience. She observed that technological change happens at a much faster pace than government can typically react to. BART plays a key role in the Bay Area, and is integrated with local transit via Clipper, the region's fare payment system, yet ridership is down on BART. Seamless and easy interconnections with other providers are important to BART's future. Clipper was a painful experience to establish, but is very successful and well-received by riders, with over 80% of riders using the contactless card for transit payments. A state-led integrated travel program must be able to accommodate variations in fare types between

providers. Further, Cal-ITP will need to address political and technological issues, in order to deliver improvements.

Donna DiMartino, CEO, San Joaquin Regional Transit District

Donna DeMartino addressed how SJRTD has grown to interconnect with nine different agencies within its 1,400 square mile operational area around Stockton. SJRTD serves cities, rural and unincorporated areas using deviated fixed route, vanpool, and private partners via a subsidy program. SJRTD has no kind of integrated fare payment mechanism, or mobile ticketing. Customers experience significant difficulties planning trips, making connections, and coordinating fare payments. Ms. DeMartino recalled the watershed moment when Google introduced GTFS – revolutionizing trip planning at no cost to transit operators, while attracting riders. SJRTD has different challenges than BART, but it also needs seamless connections, and is excited to be part of the integrated travel effort.

Jay Walder, CEO, Motivate LLC

Jay Walder recalled an anecdote from his time at NYC MTA ten years ago when MTA sued a third party for using MTA data to support a trip planning app. With BART today supporting over 80 separate apps with its data, the industry has come a long way. Given his personal experience in the roll-out of smartcards for MTA (Metrocard), London (Oyster) and Hong Kong (Octopus), Mr. Walder believes it is important to study the evolution of those solutions to understand potential hurdles for California's Integrated Travel project. The driving forces behind changes in fare collection in his experience were efficiency (in the selling and collecting of fares and delivery of services), flexibility in setting fares (based on distance or time), and regional support (where multiple transit providers supported the same mechanism). The objective was to increase ridership by delivering a simpler and better customer proposition; customers did not have to worry about what fare to buy, as the system would always choose the best option for them. Open payments within transit will support multiple mechanisms, so the form factor is irrelevant. California should not be looking for incremental change, but for a fundamental pivot towards adopting new thinking on integrated travel, breaking down the traditional barriers around what defines public transport. Four key assumptions should be:

- Microtransit and TNCs must be included;
- Prioritize street and curb space with dynamic pricing;
- Embrace and utilize data while respecting the need for personal privacy;
- Government as an Equity Partner in a profit-making business with a revenue stream for reinvestment.

Mr. Walder suggested that the way Asian (specifically Hong Kong, Japan and South Korea) systems and business models have been implemented successfully should be considered.

Matthew Hudson, Head of Strategy for IT and Data, Transport for London

Matthew Hudson commented that the journey on which California has embarked towards integrated travel is an exciting and difficult one, and TfL is willing to share its experiences to help that journey and provide inspiration. London has a history of ticketing innovation since the late nineteenth century, culminating in the launch of Oyster in 2002, and support for contactless EMV cards in 2012. Magnetic strip tickets imposed an unacceptable restriction on how many people could move through turnstiles. Oyster resolved this with faster validation times, and uptake has been popular – over 60% of fare revenue is from Oyster (40%) and contactless EMV (13%) Pay As You Go (PAYG) activity. In the past, regular commuters knew how to use the transit system, but infrequent visitors and tourist cost more to serve, as they needed to understand paper tickets and zones and fare products. Oyster and contactless EMV remove these barriers and increase ridership. Because of the number of transactions, it represents, TfL was able to work with bank card issuers to facilitate a global rule set for EMV support. TfL hired developers in-house to develop the back-office solution, which included daily and weekly fare capping to offer travelers the best value - reducing fare collection costs from 14% to 8.5%. Open data has facilitated an ecosystem of apps supporting travel planning, real-time travel information, and service status alerting. Mr. Hudson stressed the importance of good communication to address privacy concerns and ongoing public trust.

Robin Chase, Author & Entrepreneur

Robin Chase argued that America chose to make travel by automobile cheap and easy while underpricing congestion, air pollution and curb access. Private vehicles have found their limits clogging streets and the atmosphere. Technology has made it easier to take transit, and share cars and rides, but has also increased road congestion, emissions and curb use (e.g. the success of e-commerce means more deliveries by e-retailer trucks and vans). With the coming autonomous vehicles adding to the mix, Ms. Chase advocates that over the next five years California needs to rework its economic, physical and data infrastructure to accommodate these changes effectively, and make shared transport easy and cheap. Ms. Chase presented the Shared Mobility Principles for Livable Cities that promote a sustainable, multimodal and integrated vision where vehicles are right-sized, shared and zero emission. This vision sees complete interoperability

between modes of transport, which will come in part from access to open data. There is a unique and irreplaceable window of opportunity for change now.

Cal-ITP Steering Committee

Chad Edison of CalSTA announced that the project had received TIRCP funding to pursue working with intercity rail providers and public transit operators across the state to coordinate integrated travel. He emphasized that audience feedback from the Cal-ITP conference would help shape how the integrated travel pilot would evolve.

Jim Allison of CCJPA thanked the sponsors of the event who have made the conference possible. He outlined how the conference agenda would help develop a set of best practices for the execution of a pilot; the focus would be on the politics and processes rather than just the technology and use the experience of successful programs around the world to try and avoid making mistakes (although some are inevitable).

Kyle Gradinger of Caltrans agreed that making travel easy and cheap for travelers is a goal, transportation infrastructure also has to be linked seamlessly to make that happen; there is a lot to be done to make travel as convenient as possible.

Josh Shaw of CTA stated that CTA was enthusiastic about Cal-ITP, and that to get it done the right way state and local roles must be defined and established – the State as a leader and participating PTOs driving at the regional level. There is urgency behind the effort to make traveling in California better, so working collaboratively now is the first step.

Jim Baker of Cal-ITP stated the reason for the research in Europe was to learn as much as possible about successful travel planning and e-ticketing deployments instead of working in a vacuum, and that the contribution made to the State's understanding of the challenges ahead has been invaluable.

Gillian Gillett of the San Francisco Mayor's Office reminded the audience that the sense of urgency around improving the travel experience is related to land use and economic drivers, such as the high cost of housing in the Bay Area. Transportation and mobility are fundamental indicators of democracy. The topic of integrated travel should consider the importance of equity.

Mr. Allison commented that the upcoming sessions were examples of people working together to address the problem of seamless travel, and that data standards have made a lot of this possible elsewhere – having agreements that enable PTOs to share information in a common format to produce something truly useful for the consumer. It is political leadership that helps combine these things.

Mr. Edison concurred citing examples of Switzerland and Sweden where their success in coordinating so many individual agencies was the strength of their agreements.

Mr. Shaw commented that many of CTA's members have already entered into agreements with private mobility providers and while ridership may be declining, California travelers still made 1.2 billion trips last year.

Mr. Allison ended the panel session stating that there are many complex issues involved with an integrated travel program on the scale that California envisages, but that the State's role is to act as a moderator and facilitator, and to establish processes for working through those issues to a successful outcome.

Gerhard Wennerstrom, CEO, Samtrafiken

Gerhard Wennerstrom explained that Samtrafiken is a national collaboration company in Sweden, owned by 50 public transportation authorities and operators. The company focuses on getting the best value for the traveler through tight collaboration between the owners and delivering seamless ticketing across multiple modes with unified travel information. This approach has driven value for the operators, gaining market share away from private car use, and value to the State which benefits from a more sustainable society. The core value behind Samtrafiken is not the databases and systems that run the effort, but the unified agreements between the sixty owner parties. While these took considerable political will to forge, the resulting collaboration is effective.

The Swedish car industry is evolving and facing true disruption with the advent of autonomous vehicles, and the whole concept of mass transit needs to be reconsidered. To manage this change effectively, government must be bold and be prepared to fail fast in order to learn from mistakes, improve performance, and not miss trends. This disruption will have positive impacts on society and the climate, and mass transit – with a business model built on open data and common standards – will play an important role. Samtrafiken is actively working on releasing new open data sets in a unified manner, and through an open data community is engaged with over 5,000 registered developers who are able to leverage this data to produce innovative transit planning tools. This community has helped to quickly test and validate proof of concept initiatives using real-time data sets released by Samtrafiken, reducing development time and accelerating time to market. While Samtrafiken does not yet have all

modes fully incorporated, it has 25 years of experience of how to forge agreements with many disparate parties and build a successful business.

Dominik Bruhwiler, ZVV

ZVV is the transport authority in Zurich, carrying 1.8 million passengers each day with the majority (85%) using annual passes. ZVV has integrated 51 separate PTOs in the Zurich area with over 1,800 vehicles, setting fares, collecting and disbursing revenues to participating PTOs, and marketing the combined transportation services. 69% of daily commuters use public transport, while 32% of all trips in the Zurich area are made on bus and train. In Zurich, less than 50% of households own a car. Generally, higher income correlates with greater use of public transport. Since 1990 mass transit use has tripled, while private car use has stabilized. Intermodality is key to the ZVV network; in a typical commuter corridor, 70% of passengers connect from a bus service, while 21% walk and around 6% cycle. 3% drive their own cars to the train station. Car sharing services have yet to gain a share of daily commuters due to the availability of reliable public transit alternatives. A pulsed nationwide train timetable means travelers can easily memorize train schedules, and transfers are timed. Participation in the single ticket system is mandatory for all PTOs who receive federal funding.

Mr. Bruhwiler concluded that the key to a successful transit system is having an attractive, low latency network that is easy to access and use. Open, real-time data is essential to innovation, and Switzerland has demonstrated that a harmonized ticket system with fair distribution of revenues to participating PTOs is feasible.

Endre Sundsdal, CTO, Entur

Endre Sundsdal explained that Norway is a small country of 5.5 million spread across 150,000 square miles. Eighteen county-based public transportation authorities (PTAs) and sixty regional PTOs are responsible for all public transit. In the last eight years public transport has seen a 30% growth nationwide driven by increased service frequency, reliability, and updated rolling stock, combined with the impact of road tax and congestion charging on car use. 80% of ticket sales are self-service with 63% of sales via web and mobile apps. As a result, the cost of selling tickets currently stands at 9 cents on the dollar. Entur's end-to-end services for ticket sales includes ticket offices, vending machines, web and mobile apps, and APIs, all powered by a scalable back office encompassing travel planning, inventory, sales, payments, settlements and clearing. It is mandatory for Norwegian transit operators to use Entur's technical portfolio of services. Entur issued two sets of standards - applying to travel data and electronic ticketing; together these make seamless through-ticketing possible. The government funded the development and ongoing operation of a new back office that incorporates stop register, timetables and schedules valid for 120 days, real-time feeds, and a travel search engine. The complete national data repository is open for anyone to use for their own applications. In summary Mr. Sundsdal makes four key recommendations to California:

- Deliver standards with a sufficient level of detail;
- Ensure stakeholder buy-in from PTAs, PTOs and system providers;
- Include a mechanism to enforce participation and compliance;
- Have stamina, commitment and funding.

Rani Narula-Woods, Office of Extraordinary Innovation, LA Metro

Rani Narula-Woods explained that her office is focused on creating an open dialogue with the private sector to bring new ideas and products to market, and on the agency's overall ten-year strategic plan. Ms. Woods is responsible for a project that will offer an on-demand microtransit service that will be available when riders want it, where they want it, connecting more people and places to Metro's existing system. Unlike a standard bus, the service will follow turn-by-turn instructions from a navigation system that uses live traffic conditions and real-time requests for picks-up and drops-offs to generate the most efficient possible shared trips for Metro customers. The service will be used for short trips under approximately twenty minutes in defined pilot zones and use vehicles that are smaller than traditional transit vehicles.

Metro is proceeding with three separate teams. The vendors bring direct experience in planning, design, and implementation of on-demand services in North America, Europe and Asia. In an effort to place customers at the core of each business decision, the vendors will also be responsible for producing a customer success plan. Metro will ultimately choose one or more of the plans to pursue based upon feasibility and affordability. Ms Woods outlined how this program is an experiment in prioritizing user experience and user interface. By inventing and implementing this service, Metro will find out whether placing UX at the core of transit design can attract current customers to ride Metro more often, as well as bring in new customers. From a UI perspective the microtransit service, if successful, will be the first to be fully integrated with Metro's existing back office infrastructure, TAP travel 'wallet' for payments, and an account-based system valid across all modes. Metro has received a lot of interest from

other transit authorities and operators seeking a similar microtransit solution, and Metro looks forward to sharing their experience as it develops.

Senator Jim Beale

Senator Beale is author of California's Road Repair and Accountability Act of 2017 (also known as Senate Bill 1 or 'SB1') that was passed on April 6, 2017 with the aim of repairing roads, highways, improving traffic safety, and expanding public transit systems across the state. By means of an additional tax on sale of gasoline and an increase in car registration fees, SB1 will raise $52.4 billion over the next 10 years – or $5.24 billion per year – to fund the state's infrastructure. The TIRCP award of $27.34 million to the Cal-ITP initiative comes from SB1 funds. Senator Beale remarked that SB1 was the single largest infrastructure bill in the history of California, and the largest benefiting transportation of any state in the U.S. He reminded the audience that in 2017 Californians were contributing less in taxes towards transportation than they were in 1994, yet the backlog in maintenance expenditure for transit alone was $71 billion. Senator Beale pointed out that unlike in European countries, there is no funding for transit at a national level. SB1 was an effort to accomplish this at the State level, which could drive statewide transit integration. Senator Beale explained the need to support SB1, and the efforts he and his coalition are undertaking to drive public support for a program that will deliver improved mobility and social justice in California.

Lessons Learned Panel

Jim Baker introduced Jeff Beach, VP of Emerging Products at Visa, and asked him about the progress the payment industry is making to introduce contactless payments in the U.S. and catch up with the rest of the world. Today, 56 of the top 100 largest U.S. merchants are ready for contactless payments. Visa has been ramping up marketing efforts to raise public awareness of contactless. With announcements from MTA (New York) and MBTA (Boston) both supporting a move to open payments and acceptance of contactless, this may encourage issuers to act faster. Mr. Hudson of TfL remarked that two and a half years after the introduction of contactless in London, 50% of the addressable market has moved from Oyster to contactless and mobile, of which 10% is mobile wallet based (e.g. ApplePay and GooglePay). Contactless adoption has been steadily rising at about 1% every six weeks.

Question: *"How have other successful regions dealt with the 'no phone, no bank account' issue?"*

Mr. Hudson said that London has 4,000 convenience stores where Oyster cards can be topped up with cash, and while the infrastructure to support this is very expensive, it's a necessary expense to provide access to all. Ms Woods said that there's also the issue of technology accessibility that creates a divide; many people have access to a phone but not a smartphone. Metro is looking at the usefulness of SMS (text) messaging as a means of providing a digital service to non-smartphone travelers.

Question: "Should California approach integrated travel primarily as a governance problem or a technical problem?"

It's not a technical problem, commented Mr. Wennerstrom; it's a governance issue. Mr. Sundsdal added that in Norway they also focused on key stakeholder requirements before moving to establish the standards necessary to harmonize data and standing up the technical processes to facilitate the solution. Overall, the solution will either succeed with public funding or a commercial model to fund itself through profit. Mr. Baker asked Mr. Bruhwiler why an app that integrates TNC and MaaS offerings has not been popular in Switzerland. Mr. Bruhwiler responded that while he did not have clear reasons why, TNCs appear to be unnecessary in a country with such an efficient system of traditional mass transit. Mr. Hudson commented that TfL uses two distinct apps, one for travel planning and one for payments and has not found it necessary to combine the two. He worries that too much functionality might confuse customers.

Question: "How were the European countries able to ensure all transit services were involved and integrated? Were there incentives, or penalties?"

Mr. Sundsdal suggested that in Norway there was more stick than carrot. Mr. Baker commented that without standards for data, an integrated travel system will not work. Mr. Bruhwiler said there was a regional law in Switzerland compelling agencies to submit data. Mr. Wennerstrom added that in Sweden it was opposite in that there were only incentives, driven mainly by the new nationwide system enabling regional PTOs to sell more tickets in a larger market – and to infrequent travelers and tourists – so the incentive was an improved business case for participating agencies. Mr. Hudson explained that in TfL's case, they had nine regional train operators with whom to negotiate a common agreement. TfL took a stand by giving a signing deadline beyond which operators would be excluded from the agreement. This 'you're either in or you're out' approach proved to be successful and all operators signed.

Question: "In a unified fare system what will the administration look like for back office, fare configuration, redesign, customer service, etc.?"

Mr. Hudson suggested that these issues don't matter when TfL has a service contract with operators that guarantees system performance, issue resolution, and fare settlement processes with indemnities. If the service obligations are

agreed to, then it is TfL's problem to follow through. The partner operators do not care about the detail; you trust each other it's going to work, and that's backed by a contract. Mr. Bruhwiler explained that at ZVV there are approximately 200 people split between the various participating agencies who are also working on the back-office infrastructure and services, so the effort to run and maintain the integrated travel solution is shared.

Question: "Will the virtual TAP card (at LA Metro) work on Apple devices?"

Ms Woods said that this was certainly the intent but there are technical issues that Metro is working on with Apple.

Question: "How do you reconcile different fare security schemes to achieve interoperability? Is there a best practice?"

Mr. Sundsdal stated that Norway has a standardized and centralized system for secure elements. Entur distributes all the QR codes and sets the standards on how to program smartcards. Mr. Wennerstrom explained that they handle the issue a little differently whereby Samtrafiken handles the public keys while the participating agencies handle the private keys, so it's a fully secure system with a central administration at the top level. In the UK, TfL has fallen out with the UK government's central smartcard scheme (ITSO[5]) and they can't make it work due to all the issues of security, whereas bank cards just work, and they're convenient for customers.

Question: "What are the viable solutions for discounted fares (seniors, the disabled, etc.) on contactless cards?"

Mr. Hudson explained that TfL collects all the taps on readers for a specific contactless card and calculates that in the back office for the fare, unlike traditional stored-value smartcards where the calculation takes place at the reader. So once the fare has been calculated, TfL can do all sorts of things based on the account profile of that person – e.g. senior, child, job seeker – and charge the right amount. That's what is significant about this shift in calculation to the back office where discounts such as daily or weekly caps can be configured or changed when necessary. With a stored-value smartcard, TfL would have to send changes to 26,000 readers; the architecture of those systems limits what TfL can do.

Question: "Who within government started the integration process? Was it the transit agencies, cities, regional or national governments?"

Mr. Wennerstrom said the process was started by the monopolies in Sweden, such as SJ (the "Swedish Amtrak") and not the government. Mr. Bruhwiler said that in Zurich it was driven by one person, a political move. In London, said Mr. Hudson, the National Rail system and London Transport were the first to coordinate fares, and did not involve central government. The TAP card integration was driven by political dynamics in the county of Los Angeles, but primarily led by LA Metro working in conjunction with relevant local agencies. In Norway, said Mr. Sundsdal, the smartcard integration and fare structure were driven by the Norwegian State Railways and the Greater Oslo area PTAs because they had a common goal of implementing a smartcard scheme. Mr. Beach of Visa suggested that the US Department of Transportation is looking at similar approaches, and that Visa is working closely with them.

Day 2 Synopsis

The roughly five-hour agenda for the second day of the conference was focused primarily on addressing the themes of fares and payments, travel planning, data standards, and user experience. The audience also heard opinions on integrated travel from several key stakeholder PTOs.

Introductions

Following an introduction from Chad Edison, Senator Scott Wiener spoke on the topic of Connecting California. He reminded the audience that California's population continues to grow, and we have to think differently about land use patterns, transportation and how people get around. This will take a cultural shift as California has not always done the right thing, for example making it possible for people to live close to job centers. These are hard conversations, but California can get there if it continues the political will to do so. SB1 was a huge step but must be just the beginning; Mr. Wiener stated that he and several others successfully pushed to allocate more funds specifically for public transportation, but it's not nearly enough. The State must be more deeply invested in supporting local and regional efforts to improve transit. In LA and the Bay Area more dedicated sales taxes and other measures are critically important for transit projects to be paid for and completed.

If California is going to have a truly sustainable future for transport, the State is going to need support for all modes, public and private, with the appropriate regulations. The two together will allow people to move more freely and live the way they want to. Mr. Wiener reminded the audience that every major transportation infrastructure project has had issues; costing more than expected, taking longer to deliver, facing lawsuits – yet when they're built people wonder how they ever lived without them. High Speed Rail (HSR) is important for the whole state and we have to get it done.

5 https://en.wikipedia.org/wiki/ITSO_Ltd


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AREA RAIL TRANSIT

Therese McMillan, Chief Planning Officer, LA Metro

In the U.S. there is a need to shift thinking from public transportation to public mobility, stated Ms McMillan. The greatest challenge is keeping up with the speed that this is happening, and governance, policy and politics around this change – and how we adapt to it – present more issues than the technology to execute it. There are also challenges in how the public and private sectors work together to own and implement change, and what role the State of California could or should take to execute the effort successfully. This conference is an opportunity to discuss how these players interact and work together to achieve the desired outcome; the private sector is more adept at taking on risk, and mistakes are not tolerated in the public sector in the same way. Yet the complexities of integrated travel are risk-oriented, so this needs to be resolved. Three major considerations are privacy, proprietary information, and pay-to-play. If California cannot reconcile these as they relate to data, then it will not be possible to move an integrated travel scheme forward. Ultimately, we need to focus on the customer and deliver the highest quality service with the widest number of choices. Integrated travel is an opportunity to design a solution around the customer, instead of around past processes and regulation. Unlike the private sector, the public sector has the duty to serve everyone, so a combined effort is needed to deliver a quality solution that meets the needs of all travelers. Investment must be made in foundational elements of transportation, otherwise linking together sub-optimal transit systems [with integrated travel] is unproductive. We're not going to change everything tomorrow, or get it right first time – small, thoughtful steps of progress may be better.

Jennifer Bergener, COO of OCTA and MD of LOSSAN

Ms Bergener, commented that she felt inspired by the conference so far to the extent that the spirit of cooperation evident from the proceedings may help overcome elements of tribalism often found within the transportation community, including operators in her own operational area in Southern California. She outlined that the 351-mile LOSSAN corridor operates over 220 trains daily and 8 million passenger trips annually, sharing tracks with three passenger rail and two freight operators. Pacific Surfliner is the only service that operates in the corridor end-to-end, and everything it does is in response to customer demand. Recent improvements include new round-trip service, expanded business class, Twitter-based train status alerts, and a transit transfer program with 12 interconnecting local transit agencies with discounted day passes. Investment through a 2018 TIRCP grant totals over $187 million for capital improvements coordinated with regional PTOs. LOSSAN welcomes the possibility of a mobile app that integrates statewide travel with LOSSAN at partner PTO services.

Carsten Puls, CEO & President of DB Engineering & Consulting USA /CHSR

Carsten Puls concurred that the whole purpose of new transportation systems like California's HSR is to make travel easier, faster and better for the general public. Mr. Puls highlighted that in Germany it is already possible to plan and travel throughout the country with a mobile-based solution across multiple modes. Prior to 1998 Germany averaged public transportation growth of 0.4% each year, but by integrating the different modes of transportation onto one ticket, between 1999 and 2016 growth quadrupled. This is not just local and regional traffic but long-distance high-speed, too. Similarly, in California HSR needs to be the state's backbone rail network, fed with regional and local services that are so tightly integrated that the customer feels like they are on a single contiguous system, seamless for both scheduling and ticketing. The numbers speak for themselves, you will get more passengers and more revenue from integration. That fact is borne out by other systems. It's going to happen here in California, and we'll increase ridership as a result.

Jesse Waas, Systems Engineer at TriMet

For the last three years Jesse Waas has been focused on the design, development and testing of a new account-based electronic fare system called Hop FastPass. Launched in July 2017, the solution has been a great success for TriMet and the Portland, OR region. The agency pioneered the GTFS with Google and was the first agency to provide a virtual transit card within Google Pay. In the 2000s, TriMet identified the need for an open, uniform data specification to enable agencies share transit route and schedule information, for developers to leverage it for creating apps, and for people to plan travel more effectively. In 2013 TriMet launched its first mobile ticketing app allowing passengers to buy passes ahead of time and using QR codes as proof of fare payment, the solution soon captured 20% of fare revenue and led to a 30% reduction in the use of cash system-wide. Other nearby ride options such as TNCs and shared cars and bikes are also presented within the app.

In 2017 TriMet improved upon the original app-based system with the introduction of a physical Hop FastPass smartcard combined with a robust back office and contactless fare validators installed on buses and light rail platforms. Three local Portland area agencies including TriMet are participating in the scheme, which offers three fare types (youth, adult and 'honored citizen') using a flat fee structure, and fare capping allowing riders to ride for free once they've reached the cost of a pass. Hop cards are available through a channel of over 500 retailers including 7Eleven, and provide a means for the unbanked, cash-based customers to add value to their cards.

The system is account-based, supporting both anonymous and registered users, with fare calculations performed in the back office and payments linked to the customers' payment method of choice. The entire solution supports open APIs allowing it to operate with eight separate API-based vendors that comprise the overall solution architecture. This diversity reduces risk and allows vendors to focus on the project components they are best at, while allowing replacement components to be procured competitively in the future.

Enhancements under development include a focus on improved multimodal integration, and support for TNCs and shared mobility services, being accomplished with a grant under the FTA's Mobility of Demand (MOD[6]) Sandbox program. Integrated travel is like the Amazon of public transportation, with one entity finding and selling product (in this case a planning a trip and buying a travel pass), collecting revenues, and settling back to vendors (or PTOs) and providing a single account-based mechanism to manage orders, payment and track packages (or trip progress). Presenting an easy-to-use, unified transit solution is important, as customers do not want to be confronted with complex systems. The transit industry must ensure that solutions are wholly open, with exhaustive detail to APIs, delivering the complete and necessary flexibility for long-term system evolution.

Arielle Fleisher, Transportation Policy Associate at SPUR & Martin Powell, Metrolinx, Toronto

In 2015, SPUR authored a report on Seamless Transit[7] which looked at ways to make San Francisco Bay Area public transit function like one rational, easy-to-use system. One of the recommendations of this report was for agencies to standardize fares and to introduce multi-operator fare products. Ms Fleischer explained basics of fare policy and that integrated fares are a key building block to statewide integrated travel. She supports PTOs jointly organizing fare policies so that transferring between operators becomes simpler and more affordable.
Ms Fleischer explained that the lack of an integrated fare policy makes using transit confusing and cumbersome for travelers, which in turn hinders ridership growth. Existing policies penalize people who take multi-operator trips. The same policies price some people out of transit; those who have been forced to the outlying communities due to the cost of housing are the ones paying the most to use public transportation. Transit centers today are being designed for multimodal use, yet the system fails to deliver a fare policy encouraging this level of integration. With a cohesive, integrated fare policy, fares are easy to understand, logical and coordinated across all operators, reflecting regional transit patterns, while discounts, transfers and passes are harmonized. As a result, California should strive to integrate multi-operator fares, and this should be one of the incremental building blocks towards a statewide travel vision.

Martin Powell introduced the rapidly-growing Greater Toronto and Hamilton Area (GTHA) where Metrolinx provides regional bus and rail services in an area served by a total of eleven transit operations. The Metrolinx 2040 plan includes growth of bus and light rail services, while the largest growth will be in the regional rail network, with a government commitment of $15 billion in capital investment to improve facilities and service levels and achieve tighter integration between modes. Research by Metrolinx found that the complexity of understanding multiple fare rules may discourage travelers from making trips using multiple transit services[8].

In September 2017 Metrolinx published a preliminary business case report[9] on GTHA fare integration. A review of global practices suggested that Metrolinx needed to become a change leader and operate as a regional rather than local network. The key vision was to increase customer mobility and transit ridership while maintaining the financial sustainability of GTHA's transit services. Metrolinx would remove barriers and enable transit to be perceived and experienced as one network composed of multiple systems and service providers. The business study concluded that all fare structure concepts would be better than the existing one, while fare by distance achieves the Metrolinx vision, it would require significant change for customers and PTOs. Ultimately, the Metrolinx Board decided in September 2017 on a small-steps approach that would deliver the desired results more seamlessly. In January 2018 a discount was introduced for GO Transit riders to receive half-price tickets on transfer with TTC; in the first three months this has resulted in a 20% increase in short distance travel between the two systems.

Mr. Powell concluded with lessons learned by Metrolinx which include having a clear vision and scope of work; engagement with key stakeholders; creating a detailed business case to support change; have an incremental approach to minimize disruption; and consider non-fare funding to achieve the change.

Ryan McManus, Design, Operations and Communications Manager at Greenfield Labs /Ford

Ryan McManus introduced how Greenfield Labs – in collaboration with IDEO – is trying to tackle some of the issues around improving urban mobility and connected

6 MOD Sandbox http://bit.ly/2veklY1
7 Seamless Transit, April 2015 http://bit.ly/2OpTXMr
8 GTHA Fare Integration presentation by Leslie Woo http://bit.ly/2OtG2Mm
9 GTHA Fare Integration Preliminary Business Case, September 2017 http://bit.ly/2LxRoBd

travel. His group exists to evolve Ford's promise of freedom of movement through human-centered design, exploring radical ideas to bring humanity to mobility, and considering whether there is a way to approach design differently rather than just improving what has already been done. He explained that Greenfield focuses on design thinking, which is fundamentally human-centered, anchored in empathy – meaning that it is not possible to understand customer needs without walking in their shoes, seeing and experiencing what they go through. Design thinking is collaborative and interdisciplinary with a bias towards action, favoring building to think. He gave an example of a microtransit study where his team constructed from foam-core a full-scale but low-cost model of a small bus interior and experimented with multiple seating configurations to think through the design problem iteratively.

Mr. McManus outlined how design thinking includes several key aspects including desirability (people's needs and wants), viability (whether there is a business case, how is it going to be funded), and feasibility (what's the technology, does it exist today). At the intersection of these aspects is the process of transformative innovation using a Know/Make framework and non-linear, iterative process – all of which are crucial to innovation[10]. Failing a lot, Mr. McManus concluded, getting iterative and coming to a solution collaboratively is always going to outperform the lone genius in the room sketching out the solution.

Jake Sion, Transit & Jonathan Donovan, Masabi

Jake Sion explained how his company developed their Transit[11] app originally as a timetable tool but that it has evolved to become a multimodal trip planning solution that works in over 150 metropolitan areas worldwide. Mr. Sion suggested that there are two approaches to integrated journey planning, which can coexist. The first is a 'hands-on' approach whereby every California PTO is incentivized or required to join the same back office solution, submit transit data and accept a common ticket or pass. Once this is achieved, it would be necessary to build and maintain the multimodal user experience by which travelers access this system. The second is a policy-led approach where PTOs are encouraged or required to specify SDKs and/or APIs in fare collection procurements, and then let private companies compete to deliver the user experience component. At the same time, to bring private mobility operators to the table, local or state government may wish to require those companies to open their APIs as part of a permitting or operating license process.

Mr. Sion asked the question whether developing an integrated planning solution should be left to private companies or undertaken by the State. He reminded the audience that just ten years ago PTOs considered their travel data proprietary, and there was no such thing as 'open data' in the industry. Open data today now allows trip planning seamlessly across all SF Bay Area agencies, cited Mr. Sion, albeit without a payment mechanism. He explained that most PTOs who are launching mobile ticketing are doing so only inside their own branded app, even in the same metro area. Mr. Sion used as an example the existence of separate e-ticketing apps from Caltrain, VTA, Muni, SMART and Token Transit – all selling e-tickets but only for their own systems. This is exacerbated with the myriad apps for other transportation modes including ridehail, carshare, bikeshare and microtransit.

To further improve the integration of mobile trip planning and ticketing, Mr. Sion explained that SDKs between app developers is key. He cited the relationship between Transit and Masabi as an example of creating a best-of-breed solution, with the first live deployment in Ontario in July 2018. Mr. Sion believes that while California may wish to develop its own tailored solution – which he conceded was probably the most optimal but most time-consuming approach – an iterative approach could be to leverage a hybrid solution like that offered by Transit and Masabi.

Jonathan Donovan of Masabi explained that his company started in mobile ticketing, payment and validation before the advent of the smartphone. The company's JustRide platform is now a full-service payments platform that includes mobile and back office components, with the majority of deployments currently in the U.S. Mr. Donovan explained how mobile ticketing is now a requirement for PTOs, and supported Mr. Sion's view that SDKs and APIs were vital to enable system interoperability, and forge relationships between vendors to create better solutions. Masabi offers the building blocks for fare collection, and through an extensive SDK, can be fully integrated with other solutions including trip planning, while the back office remains flexible to work with a wide variety of fare media including smartcards, NFC, QR codes, contactless EMV, and mechanisms not yet to market. Mr. Donovan believes that given the huge scope of a statewide integrated travel initiative, California has an opportunity to create a model that will become an example of best practice that others will look to.

Combining Travel Planning & Payments Panel

Trevor Findley of Clevor Consulting introduced the panel and addressed a question to Arielle Fleischer and Martin Powell about what role they thought fare policy would have in a Cal-ITP initiative.

10 Vijay Kumar – Ideation, November 2016 http://bit.ly/2K6F9pL

11 https://transitapp.com/

Ms Fleischer referred to fare policy as a fundamental building block as much as API and data repository; Mr. Powell concurred adding that vision and agreements are key to an effective fare policy, and California must have those in place early before technology choices. Mr. Findley asked Mr. McManus at what stage design thinking should be applied to Cal-ITP, to which he responded that Mr. Hudson (of TfL) gave an excellent example of this – how the back office automatically makes the decision to select the best value fare for a traveler, removing the complexity of choice from the user. Cal-ITP should seek to apply this same decision process within its fare policy but across multiple PTOs and private operators, so the user is not worried or concerned about figuring out fares across potentially many different systems in one trip. Consumers should have confidence that the Cal-ITP solution will find the most equitable and best value pricing automatically.

Question: "For TriMet: what sort of obstacles did you encounter when instituting fare capping? Have you seen any revenue loss?"

Jesse Waas responded that part of the complexity was understanding the business rules in how caps were calculated as passengers traveled across different participating agencies and services, and how they were applied as credits to specific journeys. So, defining these rules up front is critical, as is educating riders on how capping works and why it is useful to them and how to communicate that. Ultimately TriMet wants to make people happy and this is one way to do that. Mr. Antrim of Trillium commented that by stopping the request for people to think, that might get people on board more often.

Question: "Who or what kind of organization could champion integrated ticketing in the Bay Area and the state of California?"

Mr. Findley suggested that another way to ask the question would be whether government should be a facilitator or an implementor of an integrated travel program; should it focus on the vision and let other parties execute; should it focus on development of platforms that multiple people can use, or should it focus on tools.

Mr. Donovan said that it's primarily about the will of PTOs wanting this to happen. It does not have to happen everywhere at the same time, it could happen on a micro level. Mr. Sion remarked how the audience had heard on Day 1 that European PTOs were told if they didn't participate they would not get subsidy dollars, so that's fairly compelling reason to be part of a common platform. An easy first step would be to show that such a solution works in a small subset of agencies. He pointed out that PTOs have a lot of strengths but being product designers is not one of them, which is one reason companies like Transit and Masabi exist.

Mike Cipresso of Google stated that his company's strategy in the transit space has been to focus on the challenges that the PTOs face and figuring out what can be turned on today rather than over a ten-year plan. He cited a small pilot Google is conducting in Las Vegas, which they plan to take to more cities, that takes infrastructure an agency already has in place and tries to retrofit a solution into that, which is a more flexible approach to that which Google is typically known for. He thought it would be hard [for California] to own the entire process from beginning to end – there will be someone out there who is better at building experiences than you can likely do with the available budget. Mr. Findley asked the panel how one could ensure that an open architecture is available in solutions that agencies procure. Mr. Waas said that one of their providers, INIT, already had proprietary APIs available and that was important to TriMet. However, APIs have to be broad to provide maximum flexibility and fulfil an agency's needs; it is vital to work with vendors upfront to define the requirements for those APIs for performance and security. Looking back at INIT, they had proprietary APIs but which were not the RESTful[12] open APIs that TriMet sought. Mr. Donovan suggested that too open may make a system too complex, so it is important to be focused on what the end user experience needs to be, and then work with partners to ensure the right solution is being put in place to enable that.

12 Overview of RESTful API description languages http://bit.ly/2M4A6rX

Question: "Is the vision to have a single system that is used at an entire state level for ALL transit, including high speed, intercity rail and regional city transit?"

Mr. Findley suggested that this conference was a key part of defining that vision, figuring out what is achievable today, what the focus should be, and what the long-term vision is for the State.

Question: "What steps are needed to integrate ADA paratransit, community transportation and rural dial-a-ride, as well as solving the first/last mile problem?"

Mr. McManus, speaking from a rider's perspective, a unified system of travel planning and ticketing that includes all modes of public and private transport, and that makes smart journey decisions, would be the ideal. But understanding specific use cases to have insight into riders' needs is key to being able to tailor the experience for them. Mr. Findley suggested that making human-centric design a core part of an integrated travel initiative would therefore be essential from day one.

Aaron Antrim, Trillium Solutions

Aaron Antrim concurred with previous speakers that it's vital that an integrated travel solution has a modular approach, to facilitate different components from diverse vendors, now and in the future. Interoperable data is what allows those components to talk together to create a cohesive system. Mr. Antrim told the story of GTFS[13] and how it originated in 2005 at TriMet when an IT manager asked why it was not as easy to get transit directions as it was driving directions. Fast forward to today, Google Maps supports transit data for around 7,000 cities and includes over 1 million transit stops. It scaled massively and beyond just Google Maps, supporting hundreds of other applications that deliver transit information. This was possible thanks to GTFS and its lightweight format for describing stops, routes, schedules and fares, and the fact that the format was licensed under Creative Commons, so anyone could use it without restriction. GTFS became a standard through steps that included use case, specification development, reference implementation, validation tools, producing and consuming software, and an ongoing specification governance and development.

Mr. Antrim proposed that TriMet is a leading example of a fully integrated payment and travel planning system due mainly to their insistence that vendors have fully developed APIs to enable interoperability between the essential system components. Rocky Mountain Institute (RMI) has been working on the question of how to actively develop, manage and govern data specifications, and has authored a paper[14] that discusses that. RMI has also created a set of best practices for GTFS implementation[15], and is currently evaluating projects for 2018-2019. This data is crucial to support a marketplace that gives travelers choices and options. Mr. Antrim supports the notion of giving travelers a choice of apps as this stimulates innovation. In conclusion, Mr. Antrim suggested that 'open' data should mean clear, published documentation available under an open license (e.g. Creative Commons); non-onerous terms, e.g. no prohibitions about showing services alongside other, potentially competing services; and same or similar terms for all parties. California, he believes, has an opportunity to define, prove and refine data standards that enable traveler choice through a robust data-enabled transportation marketplace and vigorous innovation in the IT and app marketplace.

Adam Cohen, UC Berkeley & Susan Pike, UC Davis

Adam Cohen provided the audience with an overview of the shared mobility ecosystem comprising core/incumbent services, innovative services and those that bridge the two. In order to integrate all these services there needs to be common definition of each. He referred to a recently-released study[16] from the U.S. DOT that helps to define shared mobility, current practices and guiding principles. A review of six recent studies undertaken by Mr. Cohen and his colleagues at UC Berkeley suggest that TNCs and other ride sourcing services are growing and taking business away from a variety of modes, not just public transit, such as taxis, biking, and walking; the whole marketplace has become increasingly competitive.

The impact of shared mobility on transit is in fact mixed, depending on the quality and frequency of transit service, the environment, and location. At a high level there are a lot of opportunities for shared modes to complement public transit, including first/last mile connections, public transit replacement in underserved areas, and late-night transportation. In terms of decline, while the Bay Area has relatively stable ridership, almost everywhere else in California public transit is losing market share. Travelers now understand they have a lot of options with the simplicity of an app, anytime they want. This means public transit has to evolve and create partnerships to reverse this trend. Developing proactive policy early on is really important; for example, agencies need to develop policy for allocating space between modes and operators and consider whether limits on the amount of space allocated is appropriate (e.g. curb feet, number of parking spaces), whether fees or permits are required for use of right-of-way, and processes for public involvement to ensure full and fair participation.

13 http://gtfs.org/

14 RMI, 'A Consortium Approach to Interoperable Transit Data' http://itdconsortium.org

15 http://gtfs.org/best-practices

16 https://ops.fhwa.dot.gov/publications/fhwahop16022/fhwahop16022.pdf

Public transit, said Mr. Cohen, is a very important backbone of our society, and it is easily forgotten that equity and environmental justice is evolving. Mr. Cohen and his team have authored a report to help public agencies and the private sector review equity considerations using a framework called STEPS[17]. We cannot forget this as the market moves towards digital infrastructure with mobility apps and digital fare payments. In conclusion, Mr. Cohen observed that today's travelers are part of the 'experience economy'. Responding positively to these customer expectations is absolutely necessary for public transit to succeed.

Dr. Susan Pike introduced some of the projects that the Institute of Transportation Studies (ITS) at UC Davis has been engaged upon which include researching impacts of shared mobility services on transportation systems; tracking shared mode pilots and partnerships and surveying the agencies to understand lessons learned; and helping PTOs plan and evaluate pilot programs. The challenge, she said, is to be able to design an effective policy for working with all the emerging shared modes, not just the attention-grabbing ones.

UC Davis ITS is hoping to learn from the more than sixty separate, on-demand mobility partnerships studied in California to better understand changes in ridership, potential cost savings, how equity for disabled and otherwise disadvantaged travelers is being addressed, and what forms a partnership structure. Some lessons learned have already been uncovered, for example that partnerships between PTOs and shared mobility providers should fill the right service gaps – whether they be dense urban (for late night services), suburban (for last mile services) or rural (providing general transit services all the time). Communication is also key; the program may exist but if people don't know about it, adoption rate will be low or not at all. As these partnerships take root and become more common there will be a need for regulatory consistency, addressing issues such as equity balance, and funding and what it can be applied to. In summary, Dr. Pike suggested we need to think about what types of services a California integrated travel program should include and exclude, including innovations on the horizon such as driverless cars and shuttles.

Jeremy Dalton, TravelSpirit Foundation

Jeremy Dalton introduced TravelSpirit, founded in 2016 as an advocacy network focusing on promoting universal MaaS and open innovation in a global community, with local benefit. The MaaS Alliance defines mobility-as-a-service to mean the integration of various forms of transport services into a single mobility service accessible on demand. Mr. Dalton suggested that MaaS should not be considered the Netflix for mobility since this is not optimal for the end-user; Netflix might have some shows but not others, so you need Hulu and other apps to fulfil those needs. Similarly, a bike share company might have negotiated service in San Francisco, but not Oakland, where a competitor is available. So again, the end-user needs multiple bike share apps. Today this is how most MaaS providers operate, in geographical silos based on individually negotiated contracts. Mr. Dalton proposed that an Internet of Mobility is actually needed, where an app is like a web browser; you can use whatever app you want but everyone has access to the same content, or in this case, MaaS services. Open standards and open data allow this framework, so that any app can connect with any mobility service provider and is competing for market share with customer incentives rather than services available. Mr. Dalton suggested that instead of public transit seeing shared mobility services as rivals in a small part of the overall transportation market, it should instead consider those services as partners and compete against the private automobile in the much larger market where the potential gains are substantially greater. For this to work, public and private transit data must be available in a non-exclusive way.

TravelSpirit believes that this data needs to be built, maintained and made available for transit and shared mobility to work harmoniously, and referred the audience to the *Shared Mobility Principles for Livable Cities* cited by Robin Chase in her presentation on Day 1 of the conference. Principle #8 states that we should aim for public benefits via open data; that the data infrastructure underpinning shared transport services must enable interoperability, competition and innovation, while ensuring privacy, security, and accountability. Mr. Dalton concluded with an explanation of how blockchain[18] can function in a transportation context, and it can be applied to cost allocation through smart contracts, cross-provider fare-capping and revenue distribution, secure, universal end-user accounts, and wearable travel wallets for combined mobility service accounts. Ultimately, if California takes the lead to open up data for an integrated travel program, and pressure or require public and private transport operators to do the same, it won't have to build all the technological framework itself.

Integrating Public & Private Transportation Networks Panel

DJ Mitchell of BNSF introduced the panel members who had not previously spoken, giving brief explanations of their organizations and roles. Mr. Mitchell highlighted some of the themes he had heard during the two-day conference including team sport, diversity of thought, iterate/learn/iterate/learn, simplify, integrate, keep it open, marketplace

17 STEPS – Spatial, Temporal, Economic, Physiological, Social

18 https://en.wikipedia.org/wiki/Blockchain

orientation and innovation. He asked the panel what would be the next steps that should be taken after the conference had ended. Paige Tsai of Uber said that they're very excited about bringing transportation right into the Uber app, and she feels this is the best opportunity to compete with private car ownership. But it's not just about bringing these modes into the Uber app, it's about bringing every mode into every mobile app, so people have a range of choices. She's confident that in this way we'll increase the use of shared mobility.

Mr. Cohen said that as a state, California has done a good job of setting air quality standards and leading the nation, but we haven't done a good job in the [integrated travel] area. There's a political issue where the PTOs are governed by local elected leaders and there can be difficulty at that level to push integration. This is an area where California at the legislative level or at CalSTA can lead the way in terms of setting requirements or guidance to get everyone to the table and set a timeline for doing that. Concurring with Ms. Tsai and Mr. Cohen, Dr. Pike added that creating a set of best practices for integrating travel in California would be an important first step.

Laramie Bowron of Swiftly suggested that when those in the audience who work for PTOs return to work, they should question everything including service models and the information given to passengers. There is so much that is new, it's important to question why [agencies] have historically done things in a particular set way; is it the right solution? It's important to start focusing on the passenger experience.

John Langford-Ely of Bridj said that it boils down to the customer experience, and how we make public transport more appealing and efficient. There's been a lot of discussion around fare policy, ticket integration and trip planning – that's one very important aspect to it all. But at the end of the day for the passenger experience you need to provide a really good service; he did not think there had been enough focus on that, on service planning, on optimizing your system, how you can improve resource allocation across all the different modes and get them to link together. He sees that as a massive area, leading to a reduction in subsidies required, enabling reinvestment into new initiatives.

Question: "How can we overcome the obstacle of making sure the smaller agency needs are addressed when it comes to integrated ticketing?"

Mr. Matute said that while producing the State Transit Plan, his group conducted a lot of interviews with PTOs of all sizes, and the smaller agencies were where they saw the greatest support for something like this because they don't necessarily have the capacity to evaluate the technology themselves. An integrated travel program driven at the State level would help them. Mr. Dalton added that smaller agencies spend a lot of time seeking

funding to buy vehicles so at a State level, at the very least, providing and prioritizing that kind of support – to help them get their GTFS data in place or AVL on their fleet – those services are essential.

Mr. Mitchell said that at BNSF they have been debating many of the issues the audience has heard about, but the topic debated most ferociously is the next question from the audience.

Question: "How should we as a state manage equity and the unbanked community? The applications are great, but how do we help everyone?"

Mr. Cohen said that in the context of apps and electronic fare payment we have to remember that not everyone has access to those services, and even if they do, they may not on every occasion. It is important to retain a variety of options for people. Mr. Langford-Ely mentioned a microtransit project Bridj is about to launch in Sydney with multiple payment options, so for the tech-savvy they can use the app, or pay by credit card and PayPal, or as a post-paid customer they can tap on with their Opal card or use cash. People can call a service desk and book a pick-up; the service desk then radios the driver and advises of the pick-up of a low-tech customer. Mr. Matute added that it's also possible to reduce the scale of the problem, so if the system supports contactless EMV the State could in the future issue contactless-capable electronic benefits transfer cards – plus a policy that essentially makes transit free if you're eligible for such programs – that reduces a lot of the barriers.

Ms. Tsai commented that during discussions about integrated travel it is important that PTOs raise these needs as early as possible so that public and private sectors can work together to find solutions. When Uber first started partnering with PTOs, Uber did not have a solution for people who didn't have smartphones or those who were unbanked, and it was only through this discovery process that Uber realized the need to develop those kinds of products. Mr. Cohen mentioned that the U.S. DOT has their Mobility on Demand Sandbox that's exploring many of these issues as these pilots roll out with wheelchair access, fare payment, equitable service – those findings will be available in early 2019.

Question: "When partnering with private companies such as microtransit providers, how do we ensure there is collaboration not competition?"

In the Australian context, said Mr. Langford-Ely, Bridj was contracted by Transport for New South Wales to deliver services under a robust agreement with KPIs. They take all the farebox and there are some incentives to try and grow ridership. It's been an incredibly constructive relationship with a long-term, eight-year contract that includes a private fixed rail operator with a jointly-created, integrated network plan that is contractually more flexible than traditional fixed-route service and feeding the trunk rail and BRT network. Mr. Bowron added that it's not just about first and last miles, but all the miles in between. If the private companies can entrench the whole journey with a fast and efficient service, they'll make it more appealing for people to ditch their cars. Ms. Tsai said that private operators like Uber share many of the same goals as public agencies, making cities less congested, reducing reliance on private cars, and increasing access to transportation for everyone.

Question: "From a student: How will the shift in transit agencies affect types of jobs in this [transportation] field?"

Mr. Cohen suggested that in the coming years there will be a lot of labor issues to work through on both public and private sides related to automation, and what the transportation sector plan is going to be to respond to that. Mr. Matute said he has a lot of students coming to his office asking this type of question, and his advice is to know how to collect, analyze and visualize data in a way that goes well beyond what they're taught in statistics class, as it seems that skill is going to be very relevant in the future. Mr. Langford-Ely explained that Bridj employs drivers under traditional employment agreements which are rigid and that's the biggest cost base for the company. As automation comes in he thinks there will be other roles for them, such as in customer service. There's a people management aspect to public transport, so potentially it will just be a shift in their responsibilities. Mr. Dalton commented on reputation data, and how in private transportation there is much more of an immediate feedback loop between the customer and the provider, which really does not exist in public transportation. In a more service-oriented transport market, concierge-style services are likely to enter the ecosystem – the public sector needs to be ready for this shift.

Question: "How can government agencies employ design thinking given their culture of risk aversion that Ford too once faced?"

Dr. Pike suggested that there is also a risk in doing nothing. Things are changing so rapidly, for a public agency to wait to see what happens, that's risky; they won't be ready to address those changes as they occur. Mr. Matute referred to Mr. McManus's presentation and suggested people working in transit don't appreciate what the public sees as they're not taking a design thinking approach. Mr. Cohen stated that the transportation industry needs to build a culture of continual innovation. Even if an agency is doing alright now, they need to think how to improve both internally and externally with consumers. Mr. Dalton suggested people should be cautious but not take the easiest path. Ms. Tsai highlighted the FTA's MOD Sandbox program as a way of

encouraging risk, innovation and creativity. She remarked that Dr. Pike's presentation showed California having the most public/private shared mobility pilots of any state, which reflects the culture of innovation that already exists here.

Conference Wrap-Up – Steering Committee Panel

Mr. Gradinger of Caltrans thanked the Steering Committee for driving Cal-ITP over the last year and getting to this point in the project. He suggested that the business case for integrated travel is very simple and clear; if we make it easier for people to discover, plan and ride public transportation at lower cost, ridership will go up and it becomes a virtuous cycle. He asked the panel if their personal views have changed over the last year, and what do they think should be the next steps.

Mr. Edison said that for him the most important thing was that we were having a conversation, trying to listen to stakeholders from across the state from both public and private sectors about what they need to have addressed. We've seen the opportunity to address some of the things that make it difficult to travel across the state, finding a way to lower costs of collecting revenues, finding more reasons for people to ride public transportation and increase ridership across the system as a whole. None of this is easy, but we have to find a way to make it easier for people to move around the state productively and efficiently. There's an urgency here to work on these issues; coming out of this conference there is positive energy and momentum to continue the process, take in additional feedback, and move forward.

Mr. Baker said he had learned a great deal about ticketing and travel planning over the last year, and he thanked the Advisory Board for their input that has helped craft the concept of how far the State should go with integrated travel. Should we create the framework for this transit data repository and provide open access to that, and leave it there, letting the market take it forward? We need to reach out to [the audience] in the coming weeks to ask for help to determine answers to those kinds of question.

Ms. Gillett said she was a private sector person with a background in business process modeling, so her natural inclination is to work on problems like these, to make difficult things easier through process and technology. She said that what had changed for her in the last year of working on Cal-ITP was her thinking on economics and land use issues. She has been watching the cost of housing in San Francisco rise rapidly and has seen more of her friends and neighbors move further away from the city. If the land use problem is not solved, then our response has to be one of improved mobility. At the same time, the public's frustration with the slow pace of public transport integration is manifesting itself in the boom in private sector mobility services; people are voting with their feet and [public transit] ridership is in decline. So, we have to do this much faster, and there's a collective desire to make transportation easier. There are things that an entity like the State of California could do to help us all; we can move mountains but which mountains to we want to move? What are the politics and policies to achieve it?

Mr. Allison used a Lego analogy to suggest that all the pieces of an integrated travel initiative are there, but now the State – taking on board all the things we've learned – needs to put them all together cohesively to have something that works for everyone. He explained that in California we have a broad diversity of transit agencies of different sizes. The smaller agencies might really appreciate a statewide entity coming in to provide a layer of interoperability that they otherwise could not have achieved, while the larger agencies have already embarked on ambitious and complex programs. As Cal-ITP moves ahead, the next steps need to acknowledge the great steps already taken by agencies like LA Metro, the previous steps taken on Clipper, and mesh that into a system – through common data standards and integration – and be flexible. We can put those Lego pieces together in lots of different ways.

Mr. Shaw reflected that he had been working in and around the California Transit Association for several

decades watching the public agency staffs and their Boards with good intention working on forms of integration. Until he was asked to join the Cal-ITP Steering Committee he never thought there would be the effort at statewide level. He has taken European travel systems and is frustrated that in California the travel experience it is not as easy. Mr. Shaw thanked Caltrans and CalSTA for kicking off this initiative and suggested that the conference be repeated in the future. Mr. Edison said that as Cal-ITP research was undertaken he found one of the most interesting aspects was the idea of giving people the best fare, delivering the best value proposition without travelers having to worry about it. That became a very compelling thought, solving the cost issue of traveling through a complex system across multiple providers. Mr. Gradinger concurred, adding that it's about doing what's best for the planet, for the economy, for equity.

Mr. Gradinger asked that panel to consider what would be the indicator of success that we're on the right path with this effort. For him it would be seeing his children change their inherent conditioning that the car is the first choice, and instead be able to get around California freely without a car.

Mr. Shaw said that an indicator of success would be to reconvene the event after twelve months with the same people and more, to gauge how far we've come in that time towards the goals we're setting today. Mr. Edison suggested that success is adding value to public and private transportation providers throughout California, and seeing more people using the system because we've made it easier for them.

Ms. Gillett encouraged the audience to participate in the TransportationCamp, as part of moving the conversation forward to ask practical questions for discussion. She said that one measure of success would be to ensure that gender and racial equality is better achieved at future events, because it's just good business. The issues of affordability and equity are so obviously woven into the transportation sector, when we're talking about mobility we're talking about access, not just in terms of the ADA, but upward mobility, for all people to go where they want, when they want. They should be able to use the modern technology we're building to do that in more accessible ways. If we don't get these conversations right, we risk rebuilding the terrible inequity we have in our system today into another layer for another hundred years. We have a long way to go and mobility is fundamental to get there.

Audience Interaction & Feedback Analysis

Slido In-Event Response System

The Cal-ITP conference gave an opportunity for attendees to interact with the speaker and panelists using the Slido[19] response system. Slido was a new communication tool introduced for audience engagement for this conference and it must be noted that participation in polls and questions varied throughout the duration of the two-day conference as attendees familiarized and became comfortable with this new mobile engagement platform and its integration by conference organizers. Using Slido enabled the audience to ask questions, suggest ideas, and answer polls that were opened from time to time during both days. Due to time restrictions, submitted questions and ideas were moderated before being displayed.

Attendees asked 174 questions with a total number of 483 likes and sent 929 votes in 11 separate polls. Active users shown above represents the total number of users who engaged with a question, upvote (i.e. users 'liking' a specific question) or poll. The engagement score represents the sum of all interactions, with one point awarded for each question, and a quarter point for each upvote or poll vote. Engagement per user is the engagement score divided by the number of active users.

The Slido system was well-utilized during both days of the event, with questions being submitted continuously by attendees. However, as many users were not familiar with the system, the data on each individual question in terms of engagement with the question was highly affected by the timing within the conference at which it was asked. Many early questions received little in the way of upvoting as users were not familiar with how that functionality worked. Without this full familiarity, good questions were not always elevated even though they were of interest to conference panelists and attendees. It is noted that future use of a system such as Slido would benefit from mechanisms to ensure more training of the audience and alternative ways of asking questions from the audience if important questions are not getting addressed. The full results from Slido are included in Appendix E.

19 http://www.slido.com

Some questions that garnered the most engagement were as follows:

- Who, or what kind or organization, could champion integrated ticketing in the Bay Area and in the state of California?
- How can we overcome the obstacle of making sure smaller transit agency needs are addressed vs. larger agency needs when it comes to integrated ticketing?
- Is the vision to have a single system that is used at an entire state of CA level for ALL transit? High speed, intercity rail, regional city transit?
- In a unified fare system, what will the administration look like for back office, fare configuration, redesign, customer service, etc.?
- Should California approach integrated travel primarily as a governance problem or a technical problem?
- How might integrated ticketing and travel offer the opportunity to better address the always challenging last mile?
- When partnering with private companies, such as microtransit providers, how do we ensure there is collaboration not competition?

52% of poll respondents felt that a lack of will by regional and local agencies was the number one impediment to a seamless, integrated multi-modal transport system in California, while 27% felt that it would be the lack of a state-level facilitator. This would suggest that state and regional partnership will be necessary to accomplish integration. 75% of respondents felt that the governance of the program should reflect a mix of public and private representatives on the managing entity's Board, while only 2% believed that this was a private sector only opportunity. Respondents felt that California should focus first on the policy (33%) behind an integrated travel program, followed by unified data and APIs (20%), agreements (19%) and governance (15%), while pricing and payments (9%) and standards (4%) were considered less important.

71% of respondents believe that the State should develop an integrated solution in-house specifically focused on California's needs, with the assistance of external consultants and developers, while also providing a statewide transit data repository and APIs for the private sector to access for their own innovative use. Only 3% of respondents believed that the State should not become involved.

Asked whether California agencies should work on a framework for statewide integrated trip planning and fare payment, 78% of respondents were 'very sure' that they should, while just 6% felt they needed convincing (4%) or were not sure at all (2%). 62% suggested that the next step should be to work with regional stakeholders more frequently, while 35% believed holding a Cal-ITP event annually would be good to maintain collective momentum.

Overall the audience rated the 2018 event 4.4 out of 5. Some attendees observed that there was a gender imbalance among the presenters and panelists. Of thirteen keynote and plenary session presenters on the first day five (38%) were women, while on the second day four (27%) were women.

SurveyMonkey Post-Event Attendee Survey

After the conference on May 16, 2018 all 203 attendees and speakers were invited to respond to a survey using SurveyMonkey, which received a total of 68 unique responses – representing a 33.5% response rate. The purpose of the survey was to determine audience sentiment on a number of key topics. The full results from SurveyMonkey can be found in Appendix F.

Two weeks after the Cal-ITP conference, sentiment was similar to the audience feedback received during the event. Survey results revealed that 64% of respondents were 'very satisfied' with the event, rating it 4.61 out of 5. A little over 60% felt the conference was very good in terms of relevance. When asked what was most valuable about the conference, attendees felt the diverse insights, perspectives and prior experience of European and North American agencies who presented to be important. The need to work cooperatively with the private sector was also noted, supported by the willingness of the private sector to engage to further a common mobility goal. The quality of speaker and presentation content was appreciated, as was CalSTA's leadership in bringing state agencies large and small together to share in the knowledge presented.

Asked what was least valuable about the event, respondents suggested that the pace of the agenda was rushed and the sessions too short, that some of the European presentations were not relevant to California, and that there was not enough discussion about next steps to keep the momentum going.

Some respondents noted the lack of sufficient time to network and engage with peers, while others wanted more time for questions and answers with speakers and panelists.

Attendees were asked what top five things should be included in a California Integrated Travel initiative, and responses were as follows ranked by popularity:

- Integrated payment platform (74%)
- Integrated trip planning/wayfinding (63%)
- A governance structure with State financial participation (60%)
- Combining public and private transportation options (51%)
- Framework for a statewide transit data repository (48%)

Attendees were asked what they considered would be the best approach for the State to collaborate with public transit operators, private transportation and shared mode companies, financial institutions and technology providers to move an integrated travel initiative forward in California over the next twelve months. In order of popularity the suggestions were:

- Seek input from selected pilot transit agencies for an initial platform (46%)
- Engage in further discussion at the transit agency level (37%)
- Work at the MPO/RTPA (i.e. transport planning) level (35%)
- Complete a business case analysis (26%)

However, 52% of respondents believed that the State should undertake all of the above actions.

Conference Conclusions

With a 92% approval rating among those who responded to the post-conference survey, the California Integrated Travel conference was generally very well received by attendees and should be considered a success. It provided an opportunity for CalSTA and its partners to frame the discussion of an innovative and necessary approach to improving the travel experience throughout California, while offering a chance for input from a wide audience within the state's transportation community.

The popularity of Slido for submitting questions and responding to polls suggests that the audience was productively engaged throughout the two-day event. Feedback solicited during and after the conference has provided the Cal-ITP Steering Committee with opinions on approach and next steps. There was undoubtedly a great deal of material fitted into the short, two-day agenda. The dense educational format was deemed vital by the SC for the audience to be fully informed and engaged in the urgency of the discussion for the inaugural event; all of the themes captured during Phase 1 were discussed in their relation to California at some level during the proceedings. Audience questions, polls and survey results have contributed to the findings and potential next steps presented in this report.

Recommendations for Possible Next Steps

The Cal-ITP Conference brought together many of California's important transportation stakeholders in a forum to present and review findings from the Cal-ITP Phase 1 research as well as to learn from and collaborate with speakers and other contributors sharing viewpoints on relevant aspects of integrated travel and mobility concepts, both foreign and domestic, in an effort to bring public and private partners together to begin to formulate the next steps for a statewide initiative.

Seek the best path towards maintaining creative and collaborative partnerships with governmental stakeholders, as well as a variety of private and non-profit entities in the mobility ecosystem.

While several approaches from Europe were presented and discussed at the conference, the focus going forward must be to engage the appropriate entities throughout California in exploring and planning the most suitable approaches to statewide integrated travel solutions. As a result of the research conducted in Phase 1 and findings of Phase 2, the Steering Committee is considering the following next steps as part of a third phase (Phase 3) of the California Integrated Travel project. It should be noted that Cal-ITP was awarded funding through CCJPA for a five-year project extension as outlined in *Long Term Project Funding*.

Define the Role of the Cal-ITP Steering Committee

The Cal-ITP Steering Committee developed to guide the project through the Phase 2 conference should continue to evolve and expand to address future phases of effort. It is not a static group, and should become more representative of the full set of stakeholders in Cal-ITP in the future through changes to its membership.

The Cal-ITP Steering Committee will consider how to shape a pilot program with local public transit agency partners through not only the lens of the travelling public, but also from the perspective of the state, regional, and local governments that operate or fund transportation systems in California. The Steering Committee will seek the best path towards maintaining creative and collaborative partnerships with these governmental stakeholders, as well as with a variety of private and non-profit entities in the mobility ecosystem. Thus, the following suggestions and concepts are not intended to be a top-down, state-level prescription for how to execute integrated travel programs – rather, these ideas were generated by a range of stakeholders and practice leaders across the world and are summarized here for the Steering Committee and its partners to consider exploring further.

The research conducted in Phase 1, and the presentations and discussion occurring during Phase 2 (at the conference), generated a variety of provocative ideas that could, and perhaps should, apply in California. The Steering Committee will consider these as it approaches and undertakes Phase 3 of the California Integrated Travel Project. Phase 3, which focuses on development and launching of a pilot program, in collaboration with selected public transportation operators, could be the opportunity to test out several of the ideas generated during Phases 1 and 2.

Establish an Interim Managing Entity

A key finding from Phase 2 activities points to the need for collaborative leadership to coordinate the development and introduction of a statewide integrated travel program in order to maximize value, efficiency and other benefits for all. This undertaking would require a governance structure with State financial support. This strategy is aligned with the 2040 Vision of the California State Rail Plan.

Furthermore, the State's Intercity Passenger Rail (IPR) system has the potential not only to be at the core of the Cal-ITP implementation as an initiative to reduce ticketing and fare collection costs, but also as a service in a pilot program that is linked to a plethora of regions with local transportation solutions and first/last mile mobility options.

A suitably-structured legal entity could be established with representation from key stakeholders including CalSTA, Caltrans, the California Transit Association, selected representatives of public transportation and private/shared mode operators, and other parties who will make policy, governance, communication, procurement, and implementation decisions; interact with state and federal departments, public and private transportation operators, and other relevant parties; and act as chief advocate for seamless mobility throughout California.

Recognizing that several participants during the Phase 2 process expressed concern that a State-led project could stymie existing, regional and local efforts at integrating various travel options, this interim entity should be fully aware of and take into account existing local and regional efforts aimed at achieving integration of local or regional transportation systems. This integrated travel initiative would not subsume these efforts; rather, the recommendation is that the Cal-ITP efforts support these existing efforts, possibly through a variety of technical, policy, and financial means, as well as facilitate the knitting together of local, regional and statewide integrated systems.

The State will play an important role in the effort to move California into a position that so many other state- or country-level governments have already been able to achieve across the world.

Along with the above stated concerns, it is also understood that leadership participation by the State of California brings to bear its unique authority and institutional power, with influence on many environmental, transportation and other policy stages. In addition, the availability of robust SB 1 revenues designed specifically to support integrated travel are backed by the State. Therefore, the State will play an important role in this effort to move California into a position that so many other state- or country-level governments have already been able to achieve across the world. The interim managing entity should be responsible to ensure the impetus would be on the State to partner with and support regional and local stakeholders.

Create a Program Management Office

In order to support the interim managing entity, it is recommended to establish a Program Management Office (PMO) to execute its decisions and run the day-to-day operations of an integrated travel initiative. The PMO should include sufficient personnel for general financial, contractual, legal and technical analysis and management supported by consultants specializing in pertinent fields such as electronic ticketing, trip planning, payments, open data and standards, enterprise-scale back office systems, and marketing and communications. The PMO would be responsible for the coordination and ongoing update of a Cal-ITP business case and business plan as directed by the managing entity as well as providing regular reporting. The PMO personnel and consultants should together have a proven track record of large-scale program management, technical pilot development, and integrated travel expertise. The PMO will also be responsible for coordinating an implementation plan once the business plan is adopted by the managing entity along with other task orders as they become available, including procuring the resources necessary for program implementation.

Develop a Business Case and Business Plan for Integrated Travel

The interim managing entity and PMO should collaboratively produce a business case, business plan, and implementation plan for a statewide integrated travel program that specifies the program's value, objectives, vision and mission statements; develops

policies and goals designed to achieve these objectives; allocates resources to implement the goals in a phased approach; and sets criteria against which progress and outcome can be evaluated. In developing the project elements, input and feedback should be obtained from a selection of large, medium and small California public transport agencies including California IPR that provides a state-wide rail backbone; local, regional and state funding and operations agencies; academics in transportation fields; private mobility providers; and other experts as necessary to ensure sufficient input from industry stakeholders. The business case, business plan, and implementation plan should each be professionally authored and produced, preferably in conjunction with a party external to the Cal-ITP PMO and managing entity, and with direction from the managing entity and coordination by the PMO.

Develop an Approach for California Mobility Data and Related Policies

The ability to rely on common data models and standards is critical to the success of integrating transport systems.

Another finding of Cal-ITP to date is the criticality of shared data standards and open data policies as a foundation to an integrated travel program. Many of the speakers indicated that the ability to rely on common data models and standards was critical to the success of integrating transport systems. Data standards and management schemes are being developed by a variety of consortia, including the Interoperable Transit Data Consortium in the U.S. Several speakers indicated that schemes that incentivized individual agencies to provide good data and gave them the tools and the resources to do so were likely to succeed. The managing entity should explore, develop and/or adopt schemes that incentivize agencies to provide and use good data and data models, and provide tools and resources to do so.

Plan an Integrated Travel Pilot

The Cal-ITP strategic plan should define the scope of a limited integrated travel pilot. A pilot may comprise the California IPR services with a selection of regional public transit operators of various sizes who wish to participate in a trial of integrated travel. Ideally, the agencies should operate multiple modes – e.g. intercity rail, commuter and light rail, bus and paratransit – which would be spread geographically throughout the state but together form a single contiguous travel block. To ensure testing of integration for all types of public transport, agencies that already participate in integrated systems (generally those that use smart cards or other media across multiple operators) would be included, as well as agencies who have no e-ticketing or travel planning solution today.

The interim managing entity should be responsible to pay any costs associated with supporting any of the public agencies participating in the pilot (e.g. new validation systems, upgrades to existing systems to support the selected Cal-ITP solution, integration of payments and other data and processes). A number of private/shared mode providers could also be included. The PMO will be responsible to procure and stand up all necessary services and infrastructure to operate a multi-year pilot. Phase 3 of Cal-ITP would conclude with the integrated travel platform pilot ready to launch as the first step of a fourth phase (Phase 4). ■

Appendices

Appendix A
Summary of Phase 1 European Research

This section provides a summary of Cal-ITP Phase 1 which focused on research of integrated travel best practices in Europe and is included to provide context to the Phase 2 undertaking.

Goal

As an initial step in the Cal-ITP effort, CCJPA and its partners undertook an examination of how certain countries in the European Union (EU) have gone about the planning and implementation of integrated travel. European states vary significantly in their progress towards the implementation of integrated travel and the success of their respective programs, so it was important for California to study and understand their efforts to avoid known pitfalls and learn best practices that might help a California program succeed. The key objectives of the Phase 1 research were to:

- Observe the methodology and process that each state and stakeholders have followed;
- Assess the extent to which the programs have evolved, noting core policy, relationships, business model, and depth of reach across multiple modes on a national scale;
- Extract core themes that arise from each initiative, and compare and contrast;
- Outline how California might approach the implementation of an integrated travel program that meets State policy objectives;
- Recommend next steps in the advancement of a California plan and carry forward with State approval.

Principles

The European Union aims to establish a system of 'sustainable mobility' by improving the competitiveness of environmentally-friendly modes, and by creating integrated transport networks and fair conditions of competition between modes[1]. Since 2001 all major European transport policy documents propose integrated ticketing as a high priority measure that helps to increase passenger intermodality and the attractiveness of public transport, and thus encourages travelers to use more environmentally-friendly modes of transport. Most European countries have an e-ticketing system at least in their capital today, but they are limited to some extent by the history of legacy systems, or by the fact that systems often do not use the same technical standards and can thus only be used for one particular mode of transport. While nationwide integrated travel solutions are becoming more commonplace, there is no all-encompassing solution for Europe.

The implementation of a national (or in California's case, statewide) solution is a complex process that requires the synchronized activity of diverse participants. Besides technological characteristics, legal and economic aspects play a decisive role, and a large number of stakeholders, with partly diverging interests, are involved in the implementation process. A fully-integrated, multimodal travel solution is provided by a network of heterogeneous actors and only their full commitment, cooperation and interaction will lead to meaningful results.

1 Mobil. TUM 2014 "Sustainable Mobility in Metropolitan Regions" http://bit.ly/2zWOi4m

Implementation Process Stakeholders

	PTOs are trying to increase their share in modal split by providing a better service for their customers. Therefore, resolving complicated tariff structures is an important goal.
	Users of public transport must be willing to use new fare and payment media, and to some extent share personal data. Only then will integrated ticketing have an impact on their transport behavior.
	Intermediaries, namely financial service providers and telecommunication operators, are looking for areas to expand their mobile payment services. Public transport ticketing is a promising area to do so.
	The Tourism sector aims at offering visitors an integrated package of tourist attractions to improve the holiday experience; public transport often only plays a minor role in their strategies.
	All this is framed by regulations, programs and funding of governments and administrative authorities that hope to reduce car-based emissions, accidents and congestion.

Source: Mobil. TUM 2014 'Sustainable Mobility in Metropolitan Regions'.

Process

During the summer of 2017, interviews were conducted with five European entities responsible for implementation of integrated travel within their respective regions. These were:

Transport for London (TfL), London, UK

Entur, Norway

Samtrafiken, Sweden

NS, Netherlands

ZVV, Switzerland

All five entities have embarked on travel card programs, while most offer mobile apps for either ticketing, travel planning or both. The objective of the interviews was to understand:

- key drivers of each initiative;
- policies and processes for political and technological execution;
- successes/failures, outcome and impact;
- lessons learned, and common themes between countries.

Outcome

Each region has its own specific challenges related to policy, governance, implementation and growth of an integrated travel program, and these are documented in the Phase 1 report presentations[2]. In summary, twelve key themes emerged from the research and interviews undertaken:

Policy	**Governance**	**Agreements**	**Branding**
Pricing & Payments	**Infrastructure**	**Standards**	**Unified Data & API**
Fare Media	**Customer Engagement**	**Move to Mobile**	**Mobility as a Service**

Source: Cal-ITP European Research, 2017

2 European Research Summary http://bit.ly/2spPr0A and European PTO Interviews http://bit.ly/2NyzomR

These themes, and the way in which each European entity addressed them, have direct implications for California, and suggestions made by the Phase 1 report can be summarized as follows:

Policy

The International Association of Public Transport (IAPT[3]) proposes that the vision of integrated ticketing is to enable citizens "to travel within, between and through different cities, regions and borders without the need to change the ticketing media they use". This study found that all managing entities shared this objective, but that each country varied significantly in the progress made to realizing it. Integrated ticketing policy is generally mandated at national government level and implemented by a separate agency (either profit or non-profit) reporting to the state's transportation agency, and in most cases a dominant national level rail operator. Strong governmental support has proved to be important for institutional coordination of integrated ticketing schemes, driving policy implementation, providing financial resources and strategic leadership, and supporting standardization processes. Switzerland and the Netherlands appear to have the most mature, national integrated ticketing and journey planning initiatives, and this can be directly tied to implementation of policy that is mandatory for PTOs under threat of withholding of subsidies; the extent to which their populations rely on public transport (15% and 20% respectively); leading participation of the national rail operator; and project funding.

Policy Implications for California

An integrated ticketing and travel planning initiative for California will need a well-defined state role, with significant leadership and coordination cooperation across all PTOs. Initiative objectives must be clearly defined, i.e. is this a California travel pass that coexists with current ticketing media and fare mechanisms, or is it intended to replace them? Consideration should be given whether to make integrated travel participation mandatory for all PTOs who receive state funding, mandatory for some, or voluntary for all those who wish to participate. The State should be prepared to fund the effort in its entirety, with revenue share on fare settlements to offset costs, and funding may involve transitional leaps for those PTOs who wish to fully vest in the solution i.e. replace existing ticketing/planning processes. To ensure full interoperability, cooperation will be necessary between State, regional and local entities in setting policy in areas that may include standardization for technology, data, and fare structures. Ensuring that all ridership markets (i.e., full fare, senior, student, visitor, low-income, those without banking system access etc.) are properly served by a statewide travel pass is also a policy concern[4]. Parity must be established (or preserved) across the entire customer base, considering both cash and cashless transactions.

Governance

With policy set at the national government level, the execution of that policy – and governance of all efforts in support of an integrated ticketing program – is generally undertaken in Europe by a separate entity. This was common approach with all counties studied.

Governance Implications for California

California may find it necessary to set up a legal structure as a separate entity, that reports to the State's transportation agency and/or a multi-agency board of directors, and acts as the thought-leader for managing and running a state-wide integrated ticketing program. This entity may comprise a fully-vested board of representatives from all participating state PTOs. California could follow the model of successful European programs by which the managing entity will develop a business model whereby the entity is operationally self-sustaining and create a value proposition where the initiative would increase participating stakeholders' ticket sales and provide greater exposure by combining multiple modes of transport onto a single pass.

The entity would be responsible for developing and administering a state-wide travel pass program and the infrastructure required to support it, without the burdens of legacy systems. It would define protocols and processes whereby state-funded PTOs are obliged to submit timetable, route and travel data to the entity in a unified format, with the entity managing such data in support of a state-wide travel planning component. It would be necessary to determine the best technological approach to a fare medium based on accepted standards, and appeal of mobile-based mechanisms. The entity could establish a fare pricing approach best suited to the needs of the travel pass and the participating PTOs, and a scheme whereby travel pass revenues are collected and split equitably between the PTOs and the managing entity.

Agreements

The study found that all European entities considered the establishment of agreements between the managing entity and participating PTOs to be the most fundamental requirement of an integrated ticketing initiative. Agreements typically cover administrative duties, pricing coordination, funds pool management, shared back office, revenue split, fare settlements, customer support, unified travel data and other key elements of the program.

3 http://www.uitp.org/

4 APTA, Trends in Electronic Fare Media Technology, 2004 http://bit.ly/2uRlgw9

Agreements Implications for California

Until the scope of an initial deployment in California can be understood (e.g. how many PTOs the scheme will cover at launch) it is hard to quantify the level of effort for the agreement structure and process. Using Sweden as an example, participants could agree that the managing entity will receive a portion of income by way of commission that is sufficient to support the venture and allow new investments into the scheme, but scalable based on percentage of revenue generated. Agreements could extend outside state-funded PTOs to public/private relationships, especially with complementary services such as ride sharing and MaaS providers. A successful integrated travel program should implement from the outset as many modes of transport as practicable.

Branding

Creating a memorable and trustworthy brand for a one-source travel initiative has been vital for European entities including TfL (Oyster), Sweden (Resplus), Netherlands (OVchipkaart) and Switzerland (SwissPass). Travel card branding has been extended beyond physical travel cards to mobile apps for brand recognition, as seen with the OVchip app in the Netherlands.

Branding Implications for California

California already has a number of branded travel cards such as Clipper, TAP and Compass but these are proprietary, closed-loop systems that are not interoperable outside their immediate regions of operation e.g. a Clipper card will not work on the TAP readers. A California travel pass would benefit from being branded sufficiently to alert the user to its ability to work across the state on a variety of systems. All mechanisms associated with it – e.g. mobile e-ticketing and travel planning app, for example – would share the same, clearly-identifiable brand. An integrated travel program should be supported by a major marketing initiative in collaboration with participating PTOs, with a clear differentiation from existing, localized efforts. In order to drive uptake, California must develop a consistent message in simple language that stresses integrated travel interoperability benefits and the removal of barriers, particularly relating to payment.

Pricing & Payments

Harmonization of fare pricing and payments is one of the most significant challenges facing a statewide integrated travel solution. Although numerous transit systems offer multi-modal transit services, only a few have an inter-modal fare payment system, that is seamless travel on trains and buses with a unified fare medium. Even fewer can support inter-agency payments and, correspondingly, full regional interoperability across all modes of transit. European entities have spent significant time negotiating fare structures and harmonization (based on zones, distance and/or time, for example) when planning e-ticketing schemes.

Pricing & Payments Implications for California

A California Pass that is overlaid on, and coexists with, PTOs' current payment schemes presents less of a challenge to implementation as it would not be replacing existing fare models and allows each PTO to handle cash transactions for the unbanked riders. Based on trends observed in Europe, California might desire to implement an open-loop, account-based ticketing (ABT) and payment system where fares are calculated in the back office, and innovations such as fare capping and dynamic pricing may incentivize adoption. Standards-based ABT also has the potential advantage of interoperability with private shared mobility providers while maintaining compatibility with a broad array of existing fare payment technologies[5].

Infrastructure

Three out of the five European countries studied (UK, Sweden and the Netherlands) employ gated transit systems with barriers at rail and metro stations, and validators on buses. Physical gates generally accept more than one fare media type such as paper mag stripe ticket, contactless smart travel card, 2D barcode (on user-printed e-ticket) and QR[6] code (on user mobile device), NFC[7] for mobile wallet support such as Apple Pay and Google Wallet), and contactless EMV[8] bank cards. On vehicles, validation is typically accomplished with a fixed validator (on buses) or visual inspection by driver or conductor (on buses and trains) or using a handheld reader (on trains).

Infrastructure Implications for California

It is not expected that a California solution would require new gates, card vending machines, or any other major kind of physical infrastructure, but would interoperate with existing gate and validation systems to the extent possible. The travel pass – regardless of validation type – should operate seamlessly with participating California smart card initiatives such as Clipper, TAP and Compass, and be supported on those systems' gates and validators. The Integrated Travel effort may need to identify funding for upgrades to those systems' equipment to support the California Pass, and provide a method of pass validation on PTOs who do not have an existing smart card scheme, or only support visual validation on those PTOs' vehicles. The latter is not ideal as it fails to register a journey automatically in an account-based back office system. The Integrated Travel entity should be prepared to own and manage the back-office infrastructure unless this is outsourced to a third party.

5 California Statewide Strategic Plan, Advanced Fare Payment and Accounts Technologies
6 QR - Quick Response
7 NFC - Near Field Communication
8 Europay, MasterCard, and Visa, not yet prevalent in the United States

Standards

Adoption of open standards and specifications in all aspects of integrated travel has helped European entities move away from closed, proprietary systems – broadening interoperability between systems and reducing costs, reliance on specific vendors, and risk of obsolescence.

Standards Implications for California

A California integrated travel initiative should avoid proprietary protocols and favor open standards. A new system will benefit from the many advances in integrated travel planning and ticketing over the last ten years, skip legacy system support, and be able to learn significantly from early adopters, avoiding many barriers to implementation. Those standards could, to the extent possible, cover all aspects of an integrated ticketing and travel planning architecture including transit data format and interchange methodologies, validation techniques and equipment, open payment system architecture, and back office elements.

Unified Data & API

National travel databases are a key component of European initiatives. All interviewed entities or their partners own and maintain cross-modal data in an integrated system. Countries including Norway, Sweden and Netherlands are using open data and APIs to support the development and adoption of shared-mobility information standards for bike and car share, ride-sourcing, microtransit and other new modes. Sweden and Netherlands both observed that data reciprocity from the private sector actors, who benefit greatly from open public data such as GTFS[9], is vital to support the wider mobility ecosystem and help PTOs understand how people are moving across all modes. While the flexibility of open data is extremely appealing, the quality of integrated travel tools and applications can diminish considerably if the data is not clean, not updated on a timely basis, or not available in standardized formats.

Unified Data & API Implications for California

In support of a California integrated travel project, to ensure data consistency and usability, the Integrated Travel entity could implement a data exchange requirement in which participation is mandatory for all state-funded PTOs. It may also be important to establish a central repository for all California PTO and private operator travel data with requirements for regular submission of timetable, route and stop data via a suite of APIs in a common, harmonized format. The Integrated Travel entity could also create partnerships with ride-hailing, shared mobility and MaaS providers for integration of travel and asset data at API level. The entity may also wish to consider leveraging anonymized user data – such as travel patterns – to improve statewide travel, such as optimizing interchanges between rail and bus with timetable adjustments.

Fare Media

European operators favor a combination of fare media types, as outlined in *Infrastructure*, while some are moving away from physical travel cards to e-ticketing exclusively, such as mobile and print-at-home tickets. Europe also has a mature contactless EMV market for post-pay transactions by debit/credit card at gates, increasingly popular in London and Netherlands. However, payments with contactless EMV are usually subject to a cap of €30 ($35); as a result, single transit trips need to be below this amount, and are not suitable for longer multimodal through-trips or higher fares. E-tickets can be purchased online or via a mobile app (with tickets or passes stored in the latter), while account management for linking payment sources, topping up a credit balance, and setting preferences for notifications is done via a back-office system. Innovations such as Check In Check Out (CICO) are in their infancy, and typically employed by PTOs to determine fares based on zones or distance traveled, or where interchange between PTOs at station platforms is necessary (in the Netherlands, for example). While CICO requires traveler interaction with a validator to start and end a trip, location-aware and hands-free Be In Be Out (BIBO) tracks a traveler's smart card or mobile device throughout the journey and automatically performs the start and end validation process[10].

Fare Media Implications for California

The industry trend towards mobile ticketing – combined with the appeal of travel planning, in-journey notifications, and interoperability with MaaS options – suggests that California should consider an account-based, mobile-only integrated travel program. As a California Pass is not intended to replace existing PTO fare mechanisms, there would be no requirement for the State's program to support prepaid ticketing for cash-based customers. About 5% of U.S. Visa cards are contactless-capable, while contactless payments account for less than 1% of all U.S. card transactions[11]. While contactless EMV will undoubtedly gain traction in the U.S., there are limitations to its usefulness as a payment mechanism for multi-leg journeys across multiple modes. [Note: While this was an initial finding of the research conducted in Europe, subsequent conversations during the May 2018 conference suggested that there are more opportunities involving EMV and other contactless approaches that might take into account the needs of all customers, including those without smart phones.]

9 General Transit Feed Specification http://bit.ly/2zXZde7

10 BusRide, March 2018 http://bit.ly/2mwT13g

11 Digital Transactions, March 2018 http://bit.ly/2mBv4bi

Customer Engagement

Consumers, aided by mobile technology, expect easy, efficient customer transactions in all spheres of their lives. They want their door-to-door public transport journey to run as smoothly as if they had driven there themselves—and expect technology to pave the way. 75% of travelers who use public transport in some of the world's major cities believe that e-ticketing would make travel easier, and an overwhelming 92% would welcome paperless travel[12]. The success of well-marketed, fully-integrated and multimodal travel cards (e.g. Oyster, OVchipkaart, and SwissPass) shows increased customer satisfaction with the transport system by making travel and payments easier. Apps for ticketing and travel planning further enhance the experience, and European entities are investing to improve these for more seamless functionality. All European operators interviewed either are or will be extending accounts to include non-transit payments such as parking, congestion charging, bike share and car hire – all to further engage with customer and broaden the appeal of a single, integrated travel account. More importantly, account-based relationships with customers enables PTOs to offer tailored incentives based on travel history.

Customer Engagement Implications for California

California must have a clear focus on brand awareness, partnerships for applications of a travel pass outside travel ticketing, and personalized incentives to encourage repeat travel.

Move to Mobile

The smart ticketing market is expected to grow at a 19.7% CAGR between 2017-2023 to aggregate $14.19 billion by 2023[13]. This growth will be primarily driven by increasing demand for RFID, NFC, open payment systems, QR code, and barcode technology, combined with the continuing adoption of smartphones globally. Some European entities, such as Sweden and Norway – where for the latter mobile payment adoption is over 30% – see their integrated ticketing future to be based on e-tickets (printed from web site) and a mobile app, abandoning physical smart cards altogether, while other PTOs[14] see contactless payments and smart phone apps to be the answer. Mobile phones are seen as one-stop-portals for journey planning, ticketing and payment, with a back office system calculating the cheapest price for a journey after its completion. Users can automatically receive rewards when they hit milestones of transit usage, for example free trips, or discounts with PTO partners including restaurants. A move to mobile also has financial implications for operators; European PTOs spend a hefty chunk on fare collection – up to 14% of their budget – so stand to save on capital and operating costs if they can shift to cheaper models of fare collection. Studies suggest[15] a potential 75 - 80% savings on fare payment infrastructure by moving to a fully mobile payment system, removing the expense of physical smart card media and reducing the cost of revenue collection.

Move to Mobile Implications for California

If a California travel pass will overlay existing PTOs, fares and media, there is less reason to offer physical prepaid and postpaid smart cards, and more reason to bypass legacy technologies and adopt a mobile-only strategy. Opportunities for mobile in California include:

- A method for planning a trip using the best choices of mode from public and private providers, and paying for it on the mobile device;
- The mobile app is then used as the ticket by automatically generating the appropriate validation method for any given leg on a participating PTO, and travel authorization with private mobility providers via APIs;
- The mobile app is used after ticket purchase for real-time travel and service updates, automatic rerouting due to service interruptions with alternative travel options, personalized messaging based on geolocation, and account management for payment method(s) and customer service.

Mobility as a Service

Public transportation is at the beginning of a period of significant disruption, with new MaaS products and services fundamentally shifting travelers' expectations and choices. In recent poll of 10 major European cities, more than two thirds of respondents saw app-based ridesharing services like Uber as an alternative to owning a car[16]. Three of the six countries (Norway, Sweden and Netherlands) studied by Cal-ITP said they had short or medium terms plans for MaaS to be a contributing factor in transportation growth.

Mobility as a Service Implications for California

Shared modes complement public transit and enhance urban mobility. In the U.S., 35% of Americans are combining public transit with ridesharing and taking multimodal journeys on an occasional basis, while 7% are combining ridesharing with public transit on at least a weekly basis[17]. It is clear that open public-private partnerships are ready to be established – where the capital and innovation capabilities of the private sector

12 Accenture, May 2013 https://accntu.re/2A23e1m
13 Infoholic Research, June 2017 http://bit.ly/2A0fMGf
14 Transport for Greater Manchester http://bit.ly/2iSO1XW
15 Rocky Mountain Institute, December 2015 http://bit.ly/2evbOrD
16 Getting behind the MaaS movement, November 2017 http://bit.ly/2A1CbTR
17 Masabi, May 2018 http://bit.ly/2zYuhKK

can be fully utilized[18] – and back office systems must be interfaced to allow a California travel pass to be used for payments across all modes. The Integrated Travel project should be seen as a thought-leader in transportation innovation, and full MaaS integration presents a real opportunity to distinguish a California travel pass from existing PTO smart card initiatives. From the outset, a California travel pass could be integrated with provide mobility providers such as Lyft, Uber, Zipcar, Sixt, Chariot, GoBike, and SoBi, although partnership choices will depend on the initial regions in which the travel pass would operate. The extent to which California interoperates smoothly with private partners will depend in part on the flexibility of the back-office core API and this should be prioritized as a key requirement in any solution procurement undertaken by the managing entity.

Phase 1 Recommendations

The Phase 1 report was presented to CalSTA and its partners in September 2017, and included a number of recommendations for developing the Cal-ITP initiative during the course of a second phase:

- Continue research into integrated travel emerging trends and best practices among PTOs worldwide, and attend trade events and conferences if useful to do so;
- Conduct interviews with key US and California-based PTOs to gain insights into policy, organizational, governance, and technical aspects of integrated travel;
- Socialize the concept of California integrated ticketing and travel concepts with industry alliances and other stakeholders to solicit feedback, and conduct discovery meetings with vendors of core technologies applicable to an integrated travel program;
- Strategize approach with key stakeholders regarding participation in a managing entity focused on the development of a California integrated travel solution, and investigate an optimal entity legal structure;
- Develop an agenda and budget for a California Integrated Travel Conference that would bring together key stakeholders as attendees including state-funded PTOs, private transportation and MaaS providers, academics of transportation studies, and industry experts, consultants, and developers. Speakers would include representatives of the European agencies that participated in the Phase 1 research and others relevant to developing a California approach.
- Capture the outcome of the Cal-ITP conference and unite with Phase 1 findings in a report with recommendations of next steps for a potential Phase 3.

18 Deloitte Review, The rise of mobility as a service, January 2017 http://bit.ly/2uX8GN5

Appendix B

Cal-ITP Steering Committee[1]

CalSTA	Chad Edison
Caltrans	Kyle Gradinger
Capitol Corridor Joint Powers Authority	Jim Allison
SF Mayor's Office	Gillian Gillett
California Transit Association	Josh Shaw
Xentrans *(Project Lead)*	Jim Baker

Cal-ITP Advisory Board

SPUR	Ratna Amin	CCJPA	David Kutrosky
Trillium	Aaron Antrim	SCAG	Philip Law
UC Berkeley ITS	Adam Cohen	UCLA ITS	Juan Matute
SANDAG	Linda Culp	BNSF	DJ Mitchell
Travel Spirit	Jeremy Dalton	TransitCenter	Chris Pangilinan
SJRTD	Donna DiMartino	Motivate	Jay Walder
LA DOT	Jay Kim	Clevor Group	Chris Tucker & Trevor Findley

1 Composition as of the end of Phase 1.

Appendix C

Cal-ITP Conference Participants

Robin	Aksu	Los Angeles Department of Transportation
Jessica	Alba	Stanford University
Todd	Allen	Routematch
James	Allison	Capitol Corridor Joint Powers Authority
Ratna	Amin	SPUR
Dawn	Amore	IT WORKS! Inc.
Thomas	Annicq	Axon Vibe
Brian	Annis	CA State Transportation Agency
Aaron	Antrim	Trillium
Nathan	Atherstone	City of Fairfield
Karen	Bakar	Capitol Corridor Joint Powers Authority
Jim	Baker	Xentrans, Inc.
john	barna	anrab associates, inc.
Doran	Barnes	Foothill Transit
Juliana	Barnes	Federal Railroad Administration
Adam	Barth	City of Modesto
Sara	Barz	Metropolitan Transportation Commission
Jeff	Beach	Visa
Jennifer	Bergener	LOSSAN Rail Corridor Agency
Walt	Bonneau	ALINC/Infineon
Michelle	Bouchard	Samtrans
Winsome	Bowen	Facebook
Laramie	Bowron	Swiftly Inc.
Zack	Browne	Token Transit
Dominik	Bruehwiler	Zuricht Transport Authority, Switzerland
Megan	Brunner	CA Department of Transportation Caltrans
Brian	Burkett	North County Transit District
Nicole	Burns	Google
Lisa	Carboni	Caltrans
Ezequiel	Castro	Caltrans
Tilly	Chang	San Francisco County Transportation Authority
Polly	Chapman	Trinity County Transportation Commission
Michael	Cipresso	Google
Carolyn	Clevenger	Alameda CTC
Steve	Cliff	California Air Resources Board
Alex	Clifford	Santa Cruz Metropolitan
Ashley	Cohen	Zipcar
Adam	Cohen	University of California, Berkeley
Steve	Cohn	Sacramento Rail Working Group
Greg	Coogan	Infineon Technologies
Andy	Cook	California Department of Transportation
Marques	Cook	Capitol Corridor
Casey	Courtright	Sacramento Regional Transit District
Diane	Cowin	AECOM
Grace	Crunican	San Francisco Bay Area Rapid Transit
Linda	Culp	San Diego Association of Governments
Mollie	D'Agostino	UC Davis
Danielle	Dai	City of Oakland Department of Transportation
Jeremy	Dalton	Method City / TravelSpirit
Sam	Daly	Token Transit
Mariko	Davidson	Ford Smart Mobility
Donna	DeMartino	San Joaquin RTD
Kari	Derderian	Los Angeles Department of Transportation
David	Dick	Jacobs
Roger	Dickinson	Transportation California
Azadeh	Doherty	Sacramento Area Council of Governments
Jonathan	Donovan	Masabi
Brigitte	Driller	Caltrans
Todd	Edelman	Bicycling, Transportation and Street Safety Commission, City of Davis
Chad	Edison	California State Transportation Agency
Eric	Eidlin	City of San Jose
Barry	Einsig	Cisco
Trevor	Findley	Clevor Consulting Group
Tiffani	Fink	Paratransit, Inc
George	Fink	Tahoe Transportation District
Arielle	Fleisher	SPUR
Charles	Follett	Stratam Group
Stephen	Fox	Southern California Association of Governments
Keith	Foxe	Cubic Transportation Systems
Derek	Fretheim	moovel
Julia	Friedlander	City & County of San Francisco
Gillian	Gillett	City and County of San Francisco/Office of the Mayor
Kyle	Gradinger	Caltrans Div. of Rail and Mass Transit
Claire	Grasty	Ventura County Transportation Commission
Jason	Green	Cisco Systems
Ian	Griffiths	BART
Darin	Grossi	Tuolumne County Transportation Council
Diana	Hammons	SFMTA
Carl	Hasty	Tahoe Transportation District
Nick	Haven	Tahoe Regional Planning Agency
Michael	Hendley	Capitol Corridor Joint Powers Authority
Pamela	Herhold	Bay Area Rapid Transit District
Nick	Hernandez	Caltrans
Rachel	Hiatt	San Francisco County Transportation Authority
Matthew	Hudson	Transport for London
Deepak	Indoliya	Ford Motor Company
Priscilla	Kalugdan	Capitol Corridor Joint Powers Authority
Kevin	Kane	Victor Valley Transit Authority
Jonathon	Kass	Nick Josefowitz
Alex	Kenefick	Caltrans
Doug	Kerr	Rail Passenger Association of California
Adam	Krom	Amtrak
Mark	Kroncke	Invoke Tech
Carol	Kuester	MTC
Rohan	Kuruppu	Riverside Transit Agency
David	Kutrosky	Capitol Corridor JPA
David	Laidig	Transitdata.net
John	Langford-Ely	Bridj
Riju	Lavanya	University of California, Irvine
Dan	Leavitt	San Joaquin Regional Rail Commission
Nile	Ledbetter	SFO Airport
Adina	Levin	Friends of Caltrain
Christie	Lewis	Mastercard
Benjamin	Lichty	High-Speed Rail Authority
Boris	Lipkin	California High-Speed Rail Authority
Michael	Litschi	LOSSAN Rail Corridor Agency
Kristi	Loui	Facebook
Lesley	Lowe	Stanford
Jane	Macfarlane	UC Berkeley
David	Mach	Torrance Transit
Ramses	Madou	City of San Jose
Keita	Makino	California State Polytechnic University, Pomona
Juan	Matute	UCLA Institute of Transportation Studies
Lenetta	McCampbell	Marriott International
Ryan	McManus	Greenfield Labs
Therese	McMillan	Los Angeles County Metropolitan Transportation Authority
Kate	Meis	Local Government Commission
Tony	Mendoza	CHS Consulting
Val	Menotti	BART
Kate	Miller	Napa Valley Transportation Authority
DJ	Mitchell	BNSF Railway
Jacklyn	Montgomery	CALACT
Stacey	Mortensen	San Joaquin Regional Rail Commission
Srinivas	Mysore	Ford Motor Company
Lloyd	Nadal	Solano Transportation Authority
Rani	Narula-Woods	LA Metro
Matt	Nichols	Oakland Mayor's Office
Vahid	Nowshiravan	Caltrans
Roman	Oberli	Axon Vibe
Jeff	Palmer	Amtrak
Anthony	Palmere	UC Davis
Eun	Park-Lynch	North County Transit District
Laura	Pennebaker	California Transportation Commission

Eric	Peterson	Eric C. Peterson
Sebastian	Petty	Caltrain
Vy	Phan-Hoang	Foothill Transit
Susan	Pike	UC Davis Institute of Transportation Studies
Andrew	Pitcairn	Apple
Jennifer	Pollom	Shasta Regional Transportation Agency
Ida	Posner	Railroad Development Corporation
Martin	Powell	Metrolinx
Carsten	Puls	DB Engineering & Consulting USA, Inc.
Joshua	Pulverman	California Department of Transportation
Shirley	Qian	Capitol Corridor Joint Powers Authority
SHAINA	QUINN	Utah Transit Authority
Rick	Ramacier	County Connection
Jesus	Ramirez	Capitol Coridor Joint Powers Authority
Sarah	Rasheed	San Joaquin Regional Rail Commission
Mika	Rasinkangas	InterDigital
Vanessa	Rauschenberger	Gold Coast Transit District
Erik	Reitz	Caltrans Div. of Rail and Mass Transit
Colleen	Richter	Xentrans
Stephen	Roberts	Rail Passenger Association of California
Peter	Rodgers	SLOCOG
Walter	Rosenkranz	car2go
Michael	Rosson	BCAG
Alan	Rowe	Nomad Digital
Ryan	Russo	City Of Oakland DOT
Maricela	Salazar	Sacramento Area Council of Governments
Pia	Samson	Xentrans
Elizabeth	Scanlon	Caltrain
David	Scott	Capitol Corridor Joint Powers Authority
Tejus	Shankar	UCLA
Joshua	Shaw	California Transit Association
Dean	Shepherd	Capitol Corridor
Shannon	Simonds	Caltrans
Balwinder	Singh	San Joaquin Regional Transit District
Jake	Sion	Transit App
Evan	Siroky	Conveyal
Ellen	Smith	BART
Nicole	Soultanov	SPUR
Scott	Spaulding	Santa Barbara Association of Governments
Daniel	Sperling	UC Davis
Ravi	Sreekakula	Capitol Corridor
Brian	Stanke	City of San Jose
Daniel	Statum	California Department of Transportation - DRMT
James	Stoetzel	Finger Lakes Rail Consulting Group
Vanja	Subotic	InterDigital
Cathleen	Sullivan	Alameda CTC
Endre	Sundsdal	Entur
David	Sutton	LA Metro
Pamela	Tang	Torrance Transit
Mike	Thompson	San Joaquin Regional Transit District (SJRTD)
Tina	Tran	City of Fairfield
Brian	Travis	Caltrans
Paige	Tsai	Uber
Camille	Tsao	CDM Smith
Matthew	Tucker	North County Transit District
Chris	Tucker	Clevor Consulting Group
Rory	Vaughn	Metrolink (SCRRA)
Sravan	Veerapanane	A3Ventures
Paul	Vilter	Amtrak
Oran	Viriyincy	CHK America
Jesse	Waas	TriMet
Jay	Walder	Motivate International
Christina	Watson	Transportation Agency for Monterey County
Gerhard	Wennerstrom	Samtrafiken
Dara	Wheeler	California Department of Transportation
Kate	White	California State Transportation Agency
Joshua	Widmann	Golden Gate Bridge, Highway & Transportation District
Scott	Wiener	CA State Senate
Derek	Wong	Michael Baker International
Ramon	Zavala	University of California, Davis

Appendix D

Cal-ITP Conference Agenda

Tuesday May 1

11A	—REGISTRATION OPENS—
1P-1.05P	Chairperson's Opening Remarks Kate White CalSTA
1.05P-1.10P	Welcome Address Dan Sperling UC Davis
1.10P-1.15P	Welcome Keynote Brian Annis CalSTA
1.15P-1.25P	Intelligent Mobility for California Chad Edison CalSTA
1.25P-1.35P	Integration – A View from the Bay Grace Crunican BART
1.35P-1.45P	Integrating Travel Countywide is Tough; How Can We Do It Statewide? Donna DeMartino SJRTD
1.45P-2.05P	A World Perspective on Integrated Travel Jay Walder Motivate
2.05P-2.25P	Focusing on the Customer Experience Matthew Hudson TfL
2.25P-2.45P	People, Platforms, Shared Mobility Principals *[Live Webcast]* Robin Chase Author & Entrepreneur
2.45P-3.15P	Meet the Cal-ITP Steering Group Jim Allison, Jim Baker, Chad Edison, Gillian Gillett, Kyle Gradinger, Josh Shaw (Moderator Jay Walder)
3.15P-3.40P	—REFRESHMENT BREAK—
3.40P-4.00P	Creating Inter-Agency Policy & Agreements Gerhard Wennerström Samtrafiken
4.00P-4.20P	Multimodal Travel Integration in Switzerland Dominik Brühwiler ZVV
4.20P-4.40P	The Journey to Interoperable Public Transport in Norway Endre Sundsdahl Entur
4.40P-5P	LA Metro & MicroTransit Rani Narula-Woods LA Metro
5P-5.40P	Lessons Learned & Future Evolution Jeff Beach, Dominik Brühwiler, Matthew Hudson, Rani Narula-Woods, Endre Sundsdahl, Gerhard Wennerström (Moderator Jim Baker)
6P	—END OF DAY 1—

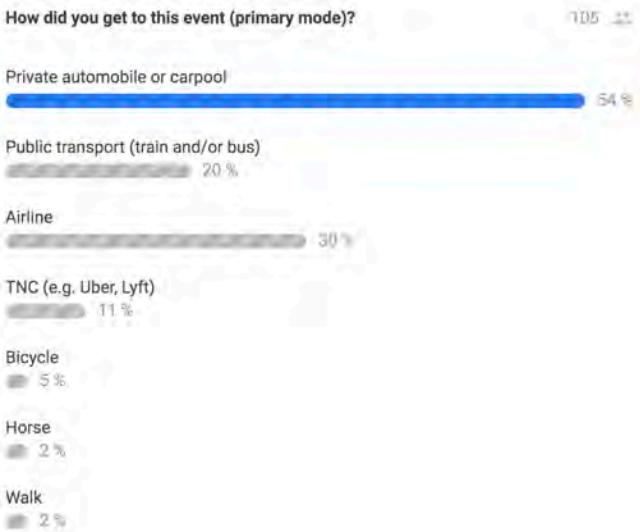
Wednesday May 2

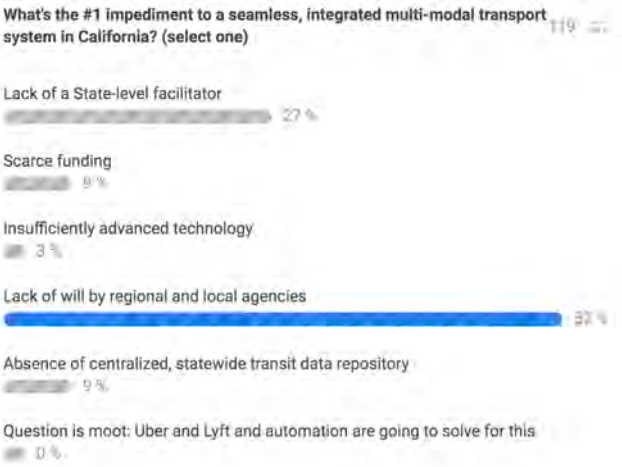
7.30A-8.30A	—CONTINENTAL BREAKFAST—
8.30A-8.35A	Chairperson's Opening Remarks Chad Edison CalSTA
8.35A-8.40A	Connecting California Scott Wiener Senator
8.40A-9A	First Downs to Touch Downs: What does it take to Truly Integrate? Therese McMillan LA Metro
9A-9.05A	Seamless Coordination with Inter-City Rail Jennifer Bergener OCTA
9.05A-9.10A	Mobile Travel Planning & Ticketing on California High Speed Rail Carsten Puls DB
9.10A-9.30A	Hop FastPass: Smart Ticketing for Multimodal Travel Jesse Waas TriMet
9.30A-10A	Fare Policy & Integration Arielle Fleisher, SPUR & Martin Powell, Metrolinx
10A-10.20A	Bringing Humanity to Mobility Ryan McManus Greenfield Labs / Ford
10.20A-10.40A	Enhancing the Consumer Experience Jonathan Donovan, Masabi & Jake Sion, Transit
10.40A-11.10A	Combining Travel Planning & Payments Successfully Aaron Antrim, Mike Cipresso, Jonathan Donovan, Ryan McManus, Martin Powell, Jake Sion, Jesse Waas (Moderator Trevor Findley)
11.10A-11.30A	—REFRESHMENT BREAK—
11.30A-11.50A	Standardized Data and APIs as Shared Infrastructure Aaron Antrim Trillium Solutions
11.50A-12.20P	Shared Mobility Impacts, Policy & Partnerships Adam Cohen, UC Berkeley & Susan Pike, UCD
12.20P-12.40P	The Internet of Mobility Jeremy Dalton TravelSpirit Foundation
12.40P-1.10P	Integrating Public & Private Transportation Networks Laramie Bowron, Jeremy Dalton, Adam Cohen, John Langford-Ely, Juan Matute, Susan Pike, Debs Schrimmer, Paige Tsai (Moderator DJ Mitchell)
1.10P-1.30P	Conference Wrap-Up & Q&A Jim Allison, Jim Baker, Chad Edison, Gillian Gillett, Josh Shaw (Moderator Kyle Gradinger)
1.30P-1.35P	Chairperson's Closing Remarks Chad Edison CalSTA
1.35P-2.30P	—LUNCH—
2.30P-6P	TransportationCamp
6P	—END OF DAY 2—

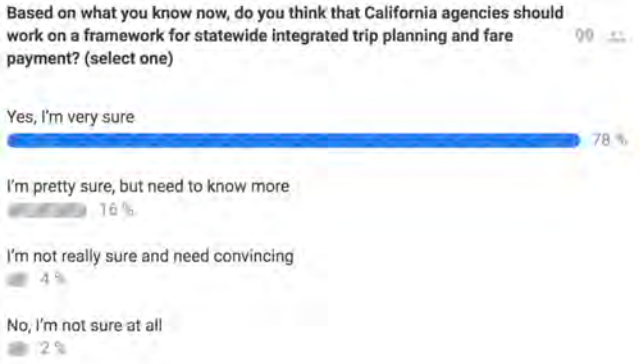
Appendix E

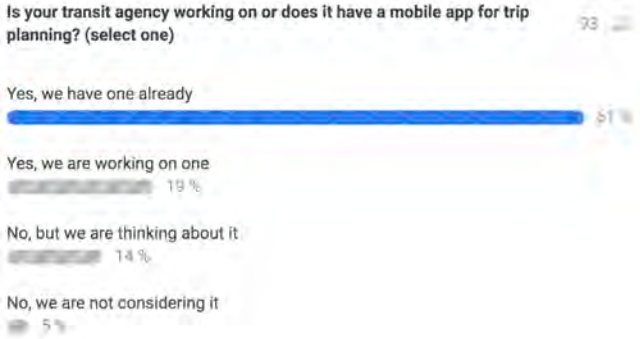
Slido Responses – Polls

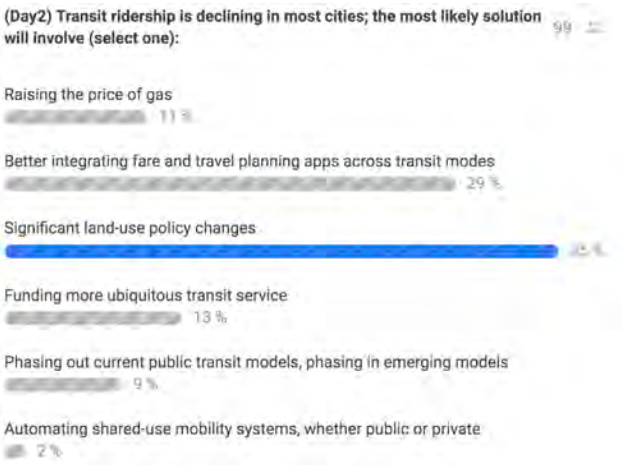
Please note that Slido was a new tool introduced for audience engagement for this conference and participation in polls and questions varied throughout the duration of the two-day conference as attendees familiarized and became comfortable with this new mobile engagement platform and its integration by conference organizers. Also, questions in the polls often omitted answers that participants thought would have been interesting to have as additional choices. The framing of the questions asked was not intended to imply a particular intended policy direction, and often triggered helpful feedback in the form of submitted questions for the panelists or feedback on the conference.



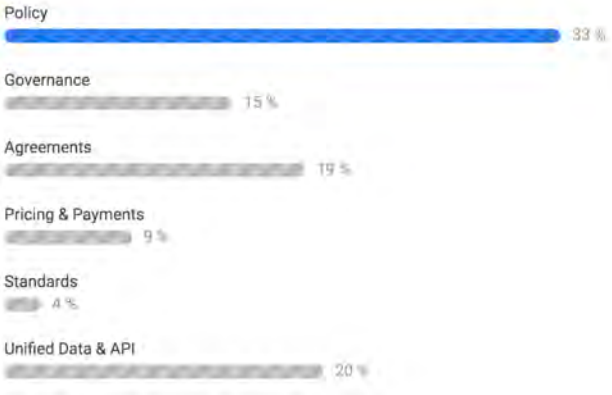




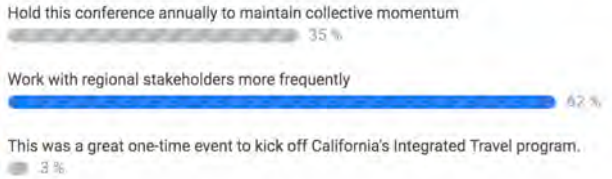




Based on what you have learned so far about integrated travel (trip planning & payment), what topic do you feel is most important for California to focus on first? 89

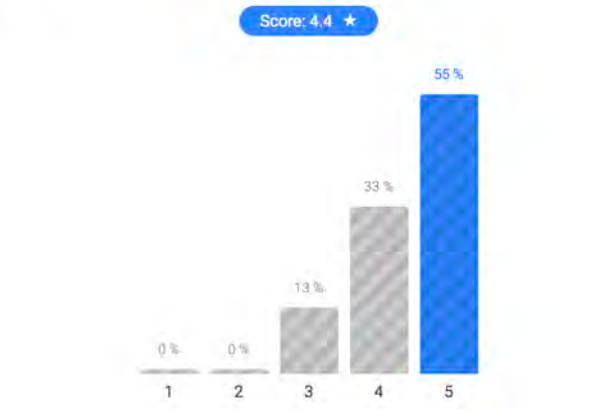


What would you like to do next? (select all that apply) 74



What role should the State play in the implementation of an integrated travel solution (select one): 59

Please rate the inaugural Cal-ITP conference (5 - it rocked!, 1 - it needs work) 40



What is the greatest opportunity for your organization with regard to integrated travel? 37

- Choosing vendors and partners that believe in the approach.
- Equity. Not repeating mistakes of the past but by providing a path forward for physical, transport mobility as a means of social mobility.
- ADDING MORE RAIL SERVICE AS BACKBONE TO INTEGRATE WITH OTHER MODES
- Reducing traffic congestion (improving mobility).
- Providing travel at a lower total cost
- Serving underserved communities
- Transit App
- Helping to define standards, integrating payments and build the MaaS App
- Increased ridership
- Increased ridership from simpler and more efficient travel opportunities for riders
- Expanding access to more people to make use of transit part of daily life, reduces duplication of marketing and app development costs. If app works well, builds trust in industry as a viable option in mobility.
- Congestion, gas prices, and helping people understand the actual cost of driving (gas, wear and tear, stress, highway widening, etc.). Future transit customers will only make that switch if they know that the actual cost savings are sufficient to outweigh the comparatively lower convenience and comfort.
- Blank slate. Development of a new service.
- Ease
- Creating a well understood and available APP.
- Market Share
- Passengers crossing modes forcing transit systems to talk to each other as well as with the regional planning agency
- Designing a passenger-centric transit hub at Diridon Station in San Jose.
- Integration that requires less thinking / planning / writing of doctoral thesis to ride us and other transit providers in a single journey
- Increase passenger convenience in trip planning and travel payments and thus increase ridership/revenues
- First and last mile solutions in areas poorly served by existing public transit.

Continued on next page >

Increased ridership by making travel data and fare payment easy to use and understand.

Opens multi-vendor opportunities.

Integrated network planning and trip linking

More accessibility for our passengers to travel farther and seamlessly using public transit options

Public and private services together

Ability to offer transportation options to the customer

Easier transit connections

Our multimodal, multi agnecy station, Diridon.

Increase shared mobility

Single payment

Political Will

Greater access to recreation

Slido Responses – Audience Questions

Who, or what kind of organization, could champion integrated ticketing in the Bay Area and in the state of California?
What can we expect out of the panelists after this conference?
How can we overcome the obstacle of making sure smaller transit agency needs are addressed vs. larger agency needs when it comes to integrated ticketing?
Is the vision to have a single system that is used at an entire state of CA level for ALL transit ? High speed, intercity rail, regional city transit?
In an unified fare system, what will the administration look like for back office, fare configuration, redesign, customer service, etc.?
For Tri-Met: what sort of obstacles did you encounter when instituting fare capping? Have you seen any revenue loss?
How have other successful regions dealt with the 'no phone, no bank account' issue?
Should California approach integrated travel primarily as a governance problem or a technical problem?
How might integrated ticketing and travel offer the opportunity to better address the always challenging last mile.
What steps are needed to integrate ADA paratransit, community transportation, and rural dial-a-ride for Trimet or Metrolinx, and across CA?
While all this great stuff is happening with mobile ticketing/integration, many of us are still tied to the outdated clipper system. How do we change this?
When partnering with private companies, such as microtranasit providers, how do we ensure there is collaboration not competition?
From a student: How will the shift in transit agencies/companies affect types of jobs in this field?
How should we as a state manage equity and the unbanked community. The applications are great but how can they help EVERYONE.
How can government agencies employ design thinking given their culture of risk aversion that Ford too once faced.
Many systems fear their subsidy requirements will will increase if they integrate with other operators. How has this been addressed?
We've heard about the most advanced examples from Asia and Europe. Which US regions have the most advanced integrated travel systems in place now?
Has the Hop Fastpass increased ridership or revenue?
For open API's how do you handle change if you need to update API but dont know or have relationship with people using the API?
For Toronto - did you agree to "keep agencies whole" who were nervous about the fare policy changes? If not, how did you overcome reluctance of operators?
Per Jay Walder's point - what would it take (legal, political) to get government into a leading role (equity stake) in payment and smart solutions?
Recommendations for working with local elected officials with parochial interests and significant power, who pose barrier to collaborative/regional solutions?
For the panel: Why are not more explicitly talking about reforming our governance change to promote integration proactively?
What would you suggest the next steps should be for CA? How can we get the ball rolling towards our end goal? What needs to be done locally, regionally, etc.
How do you reconcile the different fare security schemes to achieve interoperability? Is there a best practice?
What is in place to avoid fare evasion using mobile tickets?
From an equity perspective, how do we ensure that user groups with limited access/comfort with new technologies aren't left behind as we integrate networks
What are the viable solutions for discounted fares (seniors,disabled,etc.) on contactless cards?
To the panel: Who within government started the integration process? Was it from the transit agencies, cities, regional or national governments?
Would Uber participate in a statewide travel project with California, if it also included its competitors?
How were the European countries able to ensure all transit services were involved and integrated? Were there incentives? Or penalties?
How do we think the FTA/DOJ will react to the rapid expansion of mobile ticketing and ultimate integration given the inherent inequality of smartphone ownership
What was the biggest failure in developing a universal ticketing application?
In Europe, are (and how are) information systems for ground-based intercity transport and air networks connected?

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For Carsten Puls (DB) - were the initiatives to integrate travel inter-regional and intra-regional separate, or closely related, and if related, how?
Jesse, do you believe that open APIs work better with open and non proprietary fare security standards?
Are there circumstances where government managers must protect/restrict data to ensure fair competition, efficiency, & and achieve our statewide mobility goals?
Gov is often asked to open up data, but we may lack resources to effectively manage it. What can private entities do to also open their data? Data mgmt tools?
What options does London offer to customers that don't have access to a credit card or mobile phone?
Endre mentioned that it was mandatory for all operators to use their system. Was it tried before not making this mandatory? Do you think this is critical?
Will the virtual TAP card work on Apple devices?
For European reps: How important was it for the state to mandate that the local transit agencies follow common rules to create an excellent user experience?
Do the European systems offer means based fare policies? If so how are they integrated into the systems?
Will Hop spread across Oregon?
Is TriMet looking at selling and reloading HOP cards at your ticket vending machines?
How can we ensure integration is equitable in all forms (ADA regulations followed by Uber e.g.?)? Will regulations force private entities out of participating?
How has integration/partnerships affected legal liability?
Can we still pay with cash?
How do we develop a sense of urgency around these issues?
Panel: What are your thoughts on bringing Google to the table to help provide a solution? They created gtfs. independently. Maybe the GLab can create a platform
Endre, how are you going to approach integrating demand Responsive transit into your fare and trip planning system?
For Jennifer Bergener: Do you see a possibility of lower age limit access which reflects that the Surfliner is a commuter and regional service?
Why is a 'blockchain' the right underlying technology in the context of mobilty and doesn't it just bring another 'supplier' or 'operator'?
Jay Walker showed HK, Japan and Korea as models. Does the fact that they are geographically smaller make the process simpler? What about California's size?
How do we incentivize integration while preserving some level of local control for transit agencies? Does it need to be legislated like FasTrak?
The business case for integration is regionally integrated planning and operations and cost savings from leaner operations. What else should we think about?
For Transit App: What is the best pitch from you to get a agency like LA Metro to include their future mobile ticketing on your application?
What are important levers to bring in for a negotiation with another entity? (e.g. integrating payments with another agency or working with the private sector)
Can you expand more on the pilot integrated ticketing statewide plan demo with CalSTA, CCJPA and SJRTD and what it will entail?
For the organizers: How has the scope / focus of Cal-ITP shifted or changed since you started this effort?
Some of us walked to this event. However, there's no option for that in the poll.
Why do we need a separate app for trip planning when Google does it for free?
Wouldn't this all be easier if we weren't measured by Fare Recovery? If we were instead measured by subsidy:passenger ratio we could standardize a State fare.
TfL is great. But it is a monopoly? California faces a situation with multiple agencies and operators. Can Oyster be the answer?
Will Apple Pay, MasterCard and Visa get a fee on every transactions and will we be dependent on Cubic to provide all the solutions? (no offense to them.)
For those with NFC solutions (TfL, Clipper & others), how do you think about Apple Pay or Android Pay?
Are the bank card companies' global rules for transit use open knowledge?
Re: profit motive, can government frame mobility as a human right? EPA isn't profitable in providing clean air and water. Can transport have the same vision?
Is TfL's Oyster system / Best Value Proposition accepted on non-TfL providers? If so, how did you work out how revenue is split given the daily fare caps?
Who controls the governance of TfL? Why ARE you the most powerful public transport agency in the world?
For TFL. Are all people in the UK allowed to get a credit card for fare payment regardless of income and credit score?
Do Apple Pay or Google Pay offer any advantages over Visa and MasterCard with regards to ease of use, relative cost, willingness to partner?
Why would the automotive industry support prioritizing public transit options over personal vehicles?
How do we address the reality of parochial interests when our solutions require regional cooperation with also regional benefits.
Should an agency w/ transit card-based FCS wait to transition to an account based FCS given new technologies like mobile paymnt apps, AVs, right-sizing transit?
Can we please have contact information for Robin Chase and Matthew Hudson? Thanks!
How do we get the bay area transit agencies to take integration and mergers seriously?
How important are open and non-proprietary standards for fare security to the integrated ticketing effort?
How do you move more quickly than the RfP, RfQ, RfI currently allows?
Three revolutions only... why not four revolutions? What about the e-bike?
How sustainable are TNCs without venture capital and/or corporate support?
One challenge ..every politician wants a "stop" in their city. What can we do to enhance access but also reduce travel times to be more competitive with driving
When will Road and Kerb charging happen? When does it need to happen?
How do we achieve small, tangible "wins" that ultimately lead us toward the big, revolutionary change?
CA is facing a housing affordability crisis have you considered integration consideration of housing agencies to better connect housing development with transit
Jay - You raise the importance of "Government as an Equity Partner." To you and this panel - What does this mean? How do you define equity? Who's in this room?
Who's responsible for creating standards and facilitating differences when disagreements happen specifically in light of technology advances?
This project is funded by SB 1 (i.e. the gas tax etc.). Is the room aware this goes away if the November appeal effort is successful?
What part will the different credit card technology in Europe vs us impact advancements here?
Why haven't propositions to tax vehicle use passed in California?Has it been discussed at the government level on how to discourage single riders and congestion
Have you done outreach to those who do not utilize public transit and ask what they would need in order to use it frequently?
How can we be fully integrated when we have TNCs that don't often share data due to competitive nature of the business? How do we get around this limitation?
Is part of the discussion addressing how we commute to work? Why not promote the use of more telecommuting to address traffic congestion?
How do we incentivize integration while preserving some level of local control for transit agencies? Does it need to be legislated like FasTrak?
What would you deem as the successes and failures of Clipper as a starting point for integrated travel?
This project is funded with SB 1 (gas tax etc.) which may be subject to repeal in the November election. Will it survive w/o SB1??
Why not stop collecting fares?
How many agencies/operators are envisioned to be part of this proposed system?
If the end goal is to get people out of cars why aren't the mileage based user fee pilot folks in the room today?
Can't we promote the use of telecommuting as a means to curb traffic congestion?
What types of skills and expertise does govt need but doesn't have today? Who do we need to hire? New positions?
This project is funded with SB 1 (gas tax etc.) revenues that may be repealed in November election (if it qualifies for ballot.). Can this project survive???
"Three Revolutions" only? Are e-bikes an integral part of this? Is it Four Revolutions?
Compared to Asian countries, here public transits seem to fail in creating a point of interest by themselves. Would not it be a problem for next smart mobility?
While Clipper was painful to implement, BART riders now love it. Is there a way to build on the existing system?
Can we have access to the presentations from the conference to share with our colleagues?
Do Norway, Switzerland and Sweden provide free or subsidized mobile phones and/or data plans to low income populations?
Isn't the success of public transport in the countries we've looked at directly connected with the quality of the social safety net in these places?
Have you investigated interest from corporations looking to implement staff travel benefits to make public transit more accessible?
What has been the biggest challenge to the implementation/expansion of your regional/national travel company over the past few years?
For LA: did you look for /study gaps in the mobility network to focus microtransit service on?
Do you think there might be TOOO MANY TAP CHOICES? Why preserve distinctions between agencies?

Continued on next page >

Matthew: Who controls the governance of TfL? Why ARE you the most powerful public transport agency in the world?
Where are the women? Can we succeed without them?
How do trespasser strikes impact interconnected services with small windows of transfer times?
For Rani: What will the micro transit regulations look like for private sector partners?
Has block chain been used by any transit system? Is it being considered? What are the pros and cons?
Doesn't seamless travel payment mean discounted fares? If the agency needs to recover 25% of the cost of the trip in their region, how does that work?
How much % of the customers really have no mobile phone or bank account?
How do you manage the equity issue within your cities?
In addition to an integrated fare system, have EU countries incentivized development and densification in transit accessible areas to raise ridership?
How will the integrated fare apps include disability assistance features so the app can be accessible for all users?
In an unprecedented way the # of private mobility options is growing (bike, scooters, e-bikes, ride share etc), do agencies have to enable integration options?
Are there any women integrating transport in europe?
Can we import any of the Euro systems to California?
As part of an expanded public transportation network, why are there so few dedicated bus lanes on streets and freeways in California? Can this be an option?
For Scott Wiener: High speed rail is fine, but how to make local transit and last mile work as best as possible to complement it?
Can you each share how your public and private relationships are developed to pull off your integration experience?
For everyone: How much $ and energy is wasted when every agency in the US - or at best, regional integrator - develops their own trip planning and payment apps?
Is there any known examples of integration with robotic delivery service in a transportation apps? (To bring local goods from local stores to customers)
For A. Fleisher: Do we really have the political leadership in the Bay Area necessary for creating seamless mobility? Don't we need an accountable leader?
To achieve integrated fares, how would you suggest individual transit agencies get paid for their systems having different operational cost factors?
To Ryan from Ford, how does the recent announcement of the cancellation of almost all non truck/SUV models from Ford product line affect your work and thinking?
For Ryan: How can government employ design thinking in their work? Working within our current limits, do you have examples of RFPs for projects with good UI/UX?
Does design thinking have a place in government and transit?
Will local and regional partners allow the state to be the leader or "coach" of this statewide integration effort?
Transit App: can you track trips. For example is their is subsidy provided for a trip can we get the trip information?
Yesterday we saw only 1% of ZVV mobile ticket purchases resulted from trip planning, and intermodal journeys was 0%. How can we be more successful?
What are the opportunities to link the MAAS work being done by auto OEM's and transit/travel integration?
Perhaps I'm being facetious but is California's lack of integrated travel linked to a predominantly male leadership? Where are all the women? POCs?
What is the impact of integrated fare policy on the business models and plans of the potentially engaged service providers? How does that get resolved?
What will it take to provide customers with multi-modal trip planning (variety of services / modes in one trip)?
How do we ensure that our ADA services are part of the fare solution as we try and incentivize riders who can use multiple modes?
Should start at a regional level or state level.
What were TriMets development costs for their fare app?
Could better integrated payment and ticketing systems spur the creation of multimodal transit hubs that are designed with a more passenger-centric focus?
Adam: When will the UC-Berkeley research on the impact of ridesourcing on public transit be released?
What does regulation look like for private transportation providers? Is this a role that MPO's can fill?
What incentive does the private industry have if they can no longer corner the market on certain modes of transit?
Autonomous Vehicles. What are some of the first steps transit agencies should be taking in order to prepare for their arrival?
For Paige Tsai: What is Uber doing to reduce its negative effects on the speed of buses?
For Uber representative: what is your response to research demonstrating that in some or many locations, Uber is increasing congestion and INCREASING VMT?
How can a provider of blockchain-based transit service gain a profit while the system intrinsically does not allow someone to control the entire business?
How do I enable riders to buy transit passes in the Uber app?
What steps should transit agencies be taking to be prepared for the impact of autonomous vehicles on transportation integration and their system as a whole.
What lessons learned could Bridj share about its experience in Australia, that could help Calif.?
Curious on thoughts about Paris mayor's goal of free transit. Is there a possibility for operators to monetize on advertising / data?
Why are we not talking about the impacts of automation in this discussion? Is it irrelevant to transportation integration?
What does the steering committee want to do? Do you want to take a continuing leadership and organizing role in the development of regional or state systems?
What about China, India, Nigeria, and developing countries that have intricate and working informal "integrated" travel. What can we learn there?
Who will be the leader or champion to move CA towards a seamless integrated travel system?

Slido Responses – Audience Ideas

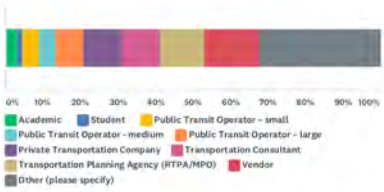
Combine transit cards and vehicle transponders for true integrated decision-making and carbon pricing. best solutions rather than distant second-best solutions.
Independent Mobility in California from the First Day of Ninth Grade! Harmonize access rules and sustainably discount transport fares, on a peer basis.
2nd poll did'nt include the best response - It is just a lower priority on a BIG list of "To Do" projects. We lack the local resources (time & staff) to lead
Promote the use of telecommuting as a means to get more cars off the roads.
Clarification from Grace Crunican: As painful as it was , Clipper is working very well now. Our riders love it.
Designing a fun commute experience that could include creating a coffee-shop vibe and / or ways to promote conversations with different people
Role of government in facilitating fare standardization and payment integration: set the mandate and series of deadlines.
Why is a 'blockchain' the right underlying technology in the context of mobilty?
These mobility integration solutions are more valuable to customers if we have more trains and bus service options to integrate.
Without robust system of trains and buses on the ground, there isn't much to integrate.
TNCs, please share data.
We need to do more than hold another conference or kick it to the regions. We need a high level policy committee to work on moving this forward.
To make business case for multi-modal transport/shared mobility as alternative to private auto bipartisan, get this Conference info to business chambers ASAP.

Appendix F

Post-Event SurveyMonkey Responses

Q1 What is your organizational affiliation?

Answered: 68 Skipped: 0



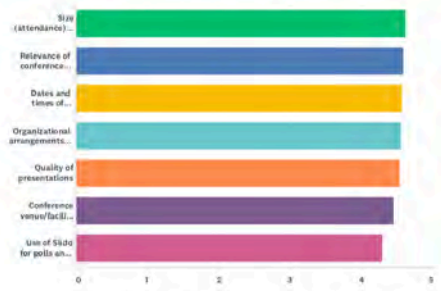
ANSWER CHOICES	RESPONSES	
Academic	2.94%	2
Student	1.47%	1
Public Transit Operator – small	4.41%	3
Public Transit Operator - medium	4.41%	3
Public Transit Operator – large	7.35%	5
Private Transportation Company	10.29%	7
Transportation Consultant	10.29%	7
Transportation Planning Agency (RTPA/MPO)	11.76%	8
Vendor	14.71%	10
Other (please specify)	32.35%	22
TOTAL		68

Answered: 66 Skipped: 2

	VERY DISSATISFIED	(NO LABEL)	(NO LABEL)	(NO LABEL)	VERY SATISFIED	TOTAL	WEIGHTED AVERAGE
☆	0.00% 0	0.00% 0	3.03% 2	33.33% 22	63.64% 42	66	4.61

Q3 How would you rate the following items?

Answered: 66 Skipped: 2



	VERY POOR	(NO LABEL)	(NO LABEL)	(NO LABEL)	VERY GOOD	TOTAL	WEIGHTED AVERAGE
Size (attendance) of conference	0.00% 0	0.00% 0	4.55% 3	30.30% 20	65.15% 43	66	4.61
Relevance of conference contents	0.00% 0	0.00% 0	3.03% 2	36.36% 24	60.61% 40	66	4.58
Dates and times of conference	0.00% 0	1.52% 1	3.03% 2	33.33% 22	62.12% 41	66	4.56
Organizational arrangements for and during the event	0.00% 0	0.00% 0	10.61% 7	24.24% 16	65.15% 43	66	4.55
Quality of presentations	0.00% 0	0.00% 0	6.06% 4	34.85% 23	59.09% 39	66	4.53
Conference venue/facilities	0.00% 0	0.00% 0	12.12% 8	30.30% 20	57.58% 38	66	4.45
Use of Slido for polls and discussion panel questions	0.00% 0	1.52% 1	18.18% 12	30.30% 20	50.00% 33	66	4.29

Q4 What was most valuable to you about this conference?

Answered: 62 Skipped: 6

#	RESPONSES	DATE
1	Hearing various ideas and discussions between sessions	7/25/2018 5:29 PM
2		7/23/2018 4:08 PM
3	Great presentation of materials	7/16/2018 11:25 PM
4	models from other countries	6/29/2018 5:15 PM
5	good understanding of the pain points that the state and local agencies are trying to solve for	6/15/2018 9:49 PM
6	Getting everyone together to get the momentum and concepts moving!	6/6/2018 5:48 AM
7	1) Hearing from multiple regions how their systems work and the diverse routes they took to creating their agreements. Also, that contracts instead of technology are the keys to a seemless experience.	6/2/2018 1:58 AM
8	The presentations from international transit operators and the professionalism displayed throughout the conference	5/29/2018 5:58 PM
9	Lessons from other countries.	5/29/2018 1:09 AM
10	Learning. I was exposed to a lot of different ideas and had the opportunity to speak with a lot of creative people who are working in adjacent fields. A lot of thoughts were provoked! I also really enjoyed TransportationCamp.	5/25/2018 6:37 PM
11	Presentations were great and people who attended. Great to be in a California focused conference.	5/24/2018 9:30 PM
12	hearing the opinions of participants through slido	5/24/2018 2:29 PM
13	The understanding of the need for good data and the standardization of data. Multiple technological solutions to address integration challenges.	5/23/2018 5:39 PM
14	A demonstrated strong push to integrate travel.	5/23/2018 3:23 AM
15	all parties (or most) affected by the need for integration in one room hearing the same discussion	5/22/2018 10:23 PM
16	best practises from abroad	5/21/2018 2:48 PM
17	It was very focused on a very important issue and how to simplify improve the use of public transportation across what-should-be more completely integrated modes.	5/19/2018 6:35 PM
18	The European perspective	5/19/2018 2:03 PM
19	The depth and breadth of the well-facilitated presentations made it clear that this topic isn't just a vision, it's a must for our future transportation system. I think it made key planners and stakeholders around the State realize how critical this topic is for success.	5/18/2018 11:16 PM
20	Variety of knowledgeable presenters.	5/18/2018 8:24 PM
21	All material	5/18/2018 5:48 PM
22	Meeting with colleagues from the industry.	5/18/2018 2:42 AM
23	other agencies presenting what they've done; technical explanations of MaaS, systems integration	5/18/2018 1:25 AM
24	Hearing about CalSTA's plans to fund traveler information and payment programs statewide.	5/17/2018 10:35 PM
25	Getting to know more about how Europe has approached transportation issues	5/17/2018 9:50 PM
26	Meeting the speakers	5/17/2018 7:39 PM
27	Hearing of what is possible and developing a vision.	5/17/2018 7:06 PM
28	The international and multi-state perspectives and case studies.	5/17/2018 5:47 PM
29	Hearing from the private sector about their own initiatives and willingness to work with the public sector to further a common mobility goal.	5/17/2018 5:09 PM
30	All stakeholders present and an impressive momentum generated.	5/17/2018 4:19 PM
31	The concrete examples from U.S. and Canada of how integration took place that explained the process from beginning to end. These presentations were the most applicable from a policy/politics standpoint and gave a clear roadmap of how to get from here to there.	5/17/2018 3:52 PM
32	The perspectives of those panel members who have already put in place integrated travel apps.	5/17/2018 3:35 PM
33	Building consensus it can be done.	5/17/2018 2:54 PM
34	Insight into the challenges present towards better intermodal and integrated payment and travel.	5/17/2018 6:17 AM
35	California State's Plans to Integrate Transportation options.	5/17/2018 3:01 AM
36	The perspectives from Europe and the US and the comparisons between the two. It was great to acknowledge what has worked in Europe while at the same time recognizing that we can't replicate the model in the exact same way in the US.	5/17/2018 2:05 AM
37	Building consensus it can be done	5/17/2018 1:02 AM
38	Understanding agency challenges.	5/16/2018 11:57 PM
39	Good representation of diverse perspectives (public/private, urban/rural, local/state)	5/16/2018 11:33 PM
40	The diverse group of participants	5/16/2018 11:02 PM
41	BRINGING TOGETHER SO MANY SPEAKERS FROM ALL OVER THE COUNTRY AND WORLD TO SHARE BEST PRACTICES ON INTEGRATING TRANSIT MODES.	5/16/2018 10:40 PM
42	Education on integrated travel learnings and successes from around the world.	5/16/2018 10:29 PM
43	The broad array of presentations from different parts of the world were on point and informative. Learning about real-life implementations was most valuable.	5/16/2018 10:28 PM
44	The ability to mingle with diverse people and groups.	5/16/2018 9:48 PM
45	hearing from the European experts on ways to make it work well!	5/16/2018 9:44 PM
46	Learning about the details of emerging fare payment technologies and practices. Open discussion of trade-offs between different approaches.	5/16/2018 9:30 PM
47	The presenters who have successfully integrated services and platforms, and seeing the thought and support of the sponsorship of the conference.	5/16/2018 9:30 PM
48	Fascinating speakers and the time to chat with some of them at Transportation Camp.	5/16/2018 9:22 PM
49	bringing diverse public and private voices into conversation with one another to start pushing one another on some of the more challenging components of integrating travel in CA	5/16/2018 9:10 PM
50	The perspectives of various ecosystem participants, especially different transit providers	5/16/2018 9:08 PM
51	Learning a lot in two jam packed half days. Also networking	5/16/2018 9:01 PM
52	Content quality and level of discussion amongst delegates	5/16/2018 8:52 PM
53	The speakers from other countries and TriMet presentation.	5/16/2018 8:51 PM
54	CalSTA participation and agency participation	5/16/2018 8:48 PM
55	Hearing about all of the factors that need to be addressed in integrating travel - technology to equity to data and everything in between.	5/16/2018 8:47 PM
56	To get better informed, and kick-off more inter agency collaboration.	5/16/2018 8:47 PM
57	Hearing what other regions/counties are working on	5/16/2018 8:46 PM
58	Perspectives outside of California / US	5/16/2018 8:42 PM
59	Open discussions about the future of integrated travel	5/16/2018 8:41 PM
60	Lots of interesting perspective on ideas from around the world.	5/16/2018 8:39 PM
61	Demonstrated how much change is required to develop CA public transportation comparable to Europe.	5/16/2018 8:38 PM
62	insights from practitioners who have experience in payment integration, and related challenges	5/16/2018 8:37 PM

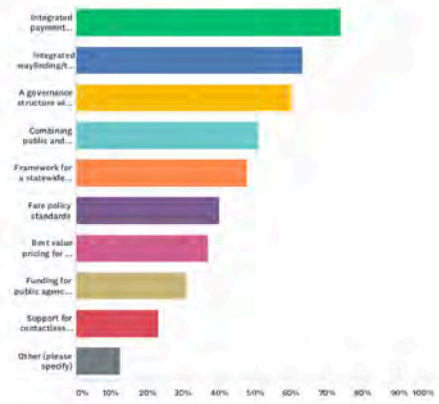
Q5 What was least valuable to you about this conference?

Answered: 60 Skipped: 8

#	RESPONSES	DATE
1	All good	7/25/2018 5:29 PM
2	.	7/23/2018 4:08 PM
3	timing	7/16/2018 11:25 PM
4	needed more time to summarize implications for California	6/29/2018 5:15 PM
5	the high level political speakers	6/15/2018 9:49 PM
6	some concrete next steps to harness the momentum would have been helpful.	6/6/2018 5:48 AM
7	I don't remember. Even the gee-whiz techno solutions that didn't solve the problem were illustrative of how more technology isn't a substitute for agreements, contracts, and policies.	6/2/2018 1:58 AM
8	Everything seemed a little rushed, though that can be expected for an inaugural event.	5/29/2018 5:58 PM
9	I am not certain.	5/29/2018 1:09 AM
10	I felt like the voice of public transportation was missing. I felt like overall tone was admonishing public transportation for not doing this already and public transit agencies didn't have an opportunity to defend themselves (furthermore its unfortunate that they would be put in a position to defend themselves and that it was not structured as a conversation, an exchange)	5/25/2018 6:37 PM
11	Lack of networking opportunities. I think it had more to do with the venue facilities	5/24/2018 9:30 PM
12	Found interesting but experience in Switzerland not that applicable to North American environment.	5/24/2018 2:29 PM
13	The international presentations on technology were not very valuable. Additionally, presentations on projects that were in the process of being implemented were least valuable.	5/23/2018 5:39 PM
14	Nothing	5/23/2018 3:23 AM
15	Some of the topics that came up during the panel discussion, sometimes too off topic.	5/22/2018 10:23 PM
16	none	5/21/2018 2:48 PM
17	Nothing stood out as "least valuable"	5/19/2018 6:35 PM
18	Nothing	5/18/2018 11:16 PM
19	don't know	5/18/2018 8:24 PM
20	Nothing	5/18/2018 5:48 PM
21	Bottled water when there was a drinking fountain nearby.	5/18/2018 2:42 AM
22	robin chase's presentation: I've seen it many, many times before and didn't really have anything new.	5/18/2018 1:25 AM
23	Hearing about European and private sector applications that may be difficult to apply in our CA context.	5/17/2018 10:35 PM
24	Some local CA issues related presentations. Although I completely understand that this conf was for CA	5/17/2018 9:50 PM
25	NA	5/17/2018 7:39 PM
26	Concern as to the funding and practicality of doing what is necessary to really make a seamless and affordable system.	5/17/2018 7:06 PM
27	It would have been helpful if more time could have been provided for the panel discussions. they provided an excellent opportunity for real world discussion.	5/17/2018 5:47 PM
28	We are a smaller MPO (Lake Tahoe) with minimal resources to accomplish some of these lofty goals. It was great to hear about digitized fare systems and trip planning tools, but it's difficult to imagine our transit agencies achieving these goals without significant funding assistance.	5/17/2018 5:09 PM
29	A clear roadmap ahead would keep this momentum alive.	5/17/2018 4:19 PM
30	The presentations from Europe of full integration - they presented the end state which is a degree of integration that is hard to imagine given where we are today. They didn't give a clear roadmap of how to get from where we are today to where they are, so I found them disheartening rather than inspirational. Their policy/political context was also less applicable.	5/17/2018 3:52 PM
31	not gaining a clear idea about how I can assist in bringing integrated travel apps to reality in California and the U.S. I want to stay involved.	5/17/2018 3:35 PM
32	Not enough concrete next steps.	5/17/2018 2:54 PM
33	I expected greater focus on how technology can enhance service delivery, planning integration and efficiency	5/17/2018 6:17 AM
34	Nothing	5/17/2018 3:01 AM
35	I would have appreciated a format more conducive to networking (meals or breaks).	5/17/2018 2:05 AM
36	No next step articulated	5/17/2018 1:02 AM
37	There isn't anything I didn't find valuable.	5/16/2018 11:57 PM
38	Sometimes we say "international" and we mean "Western Europe." I would have traded some European presentations for other international examples. Also - this was pointed out by one of the panelists, but there could have been a better gender balance in attendees/speakers.	5/16/2018 11:33 PM
39	"Integrated" is a pretty general term and there was some discussion that did not seem to connect	5/16/2018 11:02 PM
40	CAN'T THINK OF ANYTHING	5/16/2018 10:40 PM
41	Elected officials as speakers	5/16/2018 10:29 PM
42	Roundtable discussions on the second day.	5/16/2018 10:28 PM
43	The facility could have used some creature comforts (windows, water on tables, &c)	5/16/2018 9:48 PM
44	Wish there could be more interaction with other attendees	5/16/2018 9:44 PM
45	The representation of European examples felt a bit heavy. Not all the lessons were applicable. It would be have been interesting to see more room for debate amongst different approaches and ideas. Compare/contrast...	5/16/2018 9:30 PM
46	I suppose the polling.	5/16/2018 9:30 PM
47	I couldn't easily find other transit agency staff. Would have liked a birds of a feather reception.	5/16/2018 9:22 PM
48	that there was no small group time to engage more with some of the presenters and attendees.	5/16/2018 9:10 PM
49	There was really nothing invaluable	5/16/2018 9:08 PM
50	How short the sessions were and how quickly it transitioned from speaker to speaker. No time to absorb the information and yes I took 14 pages of notes.	5/16/2018 9:01 PM
51	N/a	5/16/2018 8:52 PM
52	N/A	5/16/2018 8:51 PM
53	Start up and small company presentations	5/16/2018 8:48 PM
54	Nothing springs to mind.	5/16/2018 8:47 PM
55	As fascinating and informative as it is to learn about robust, European systems, the finances and their structure is just so different, hearing multiple experiences from them (especially from the Nordic nations) probably wasn't needed. Would have liked to learn more about Best Practices that could actually be implemented here in California and the US.	5/16/2018 8:47 PM
56	the summary panels were not useful, Q&A was horrible and the lack of policy discussion frustrating	5/16/2018 8:46 PM
57	Not enough time for discussion / Q&A	5/16/2018 8:43 PM
59	Some discussion panels trying to field questions that are difficult to address as a panel.	5/16/2018 8:39 PM
60	the slido survey questions were limited - some needed additional options, or an "other" option	5/16/2018 8:37 PM

Q6 After attending the conference, I believe the State should include the following in a California Integrated Travel initiative (select your top 5).

Answered: 65 Skipped: 3



ANSWER CHOICES	RESPONSES	
Integrated payment platform	73.85%	48
Integrated wayfinding/trip planning	63.08%	41
A governance structure with State financial participation	60.00%	39
Combining public and private transportation options	50.77%	33
Framework for a statewide transit data repository	47.69%	31
Fare policy standards	40.00%	26
Best value pricing for the customer	36.92%	24
Funding for public agency participation	30.77%	20
Support for contactless bank and credit cards	23.08%	15
Other (please specify)	12.31%	8

Not a data repository but an exchange, broker, and digital rights verifier

6/15/2018 9:51 PM View respondent's answers Add Tags

integrated network planning

5/21/2018 2:51 PM View respondent's answers Add Tags

Open fare payment APIs that any app developer can utilize

5/18/2018 2:46 AM View respondent's answers Add Tags

Without State Level Governance, Participation and Reform, I fear progress will be very slow.

5/17/2018 6:24 AM View respondent's answers Add Tags

The State, like the feds, focus primarily on urban commute and freight. To encourage integrated transportation, pricing policy, and electronic platforms across the state would mean first creating policy that supports and encourages it for all kinds of travel purposes. I would then like to see funding available to assist services in making it so.

5/16/2018 9:38 PM View respondent's answers Add Tags

Guidelines and specifications for interoperability

5/16/2018 9:32 PM View respondent's answers Add Tags

Invite (more) Airports to be part of the integrated travel component and discussion

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Policy discussion about how there are barriers to implementing a number of new technologies - focused on barriers such as Title VI, ADA, other

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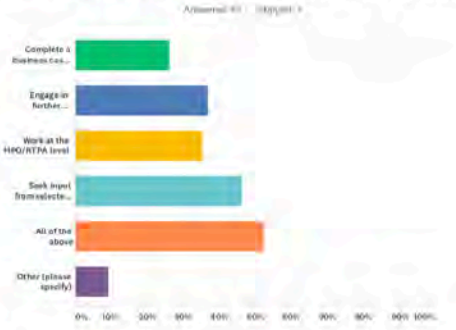
Continued on next page >

Q7 The best approach for the State to collaborate with public transit operators, private transportation and mobility companies, financial institutions and technology providers to move Integrated Travel forward in California over the next 12 months is to... (select all that apply):



ANSWER CHOICES	RESPONSES	
Complete a business case analysis	26.15%	17
Engage in further discussion at the transit agency level	36.92%	24
Work at the MPO/RTPA level	35.38%	23
Seek input from selected pilot transit agencies for an initial platform	46.15%	30
All of the above	52.31%	34
Other (please specify)	9.23%	6

Continue to hold regular, update meetings with all interested stakeholders and update website. Maintain transparency of process.

5/18/2018 5:50 PM View respondent's answers Add Tags

Implement and enforce a requirement for transit agencies to use contactless fare payment across the state with bank cards.

5/18/2018 2:46 AM View respondent's answers Add Tags

Facilitate cooperative agreements and invest in tech

5/17/2018 1:08 AM View respondent's answers Add Tags

INCREASE RAIL AND TRANSIT FUNDING SO THERE IS MORE SERVICE TO INTEGRATE

5/16/2018 10:43 PM View respondent's answers Add Tags

Prioritize demonstrations and pilot projects. Talk is good but California must act fast.

5/16/2018 8:46 PM View respondent's answers Add Tags

Link existing funding programs to local transit operator participation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California Integrated Travel Project