

California Integrated Travel Project (Cal-ITP) Market Sounding

Market Response Summary

Issued by:

Caltrans, on behalf of the California Integrated Travel Project

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Disclaimer

This Market Response Summary Report provides a summary of the Market Sounding process that occurred for the California Integrated Travel Project (Cal-ITP) from August to October of 2019. In order to protect the Market Sounding respondents' commercial information, and to foster candor, the information outlined in this report is summarized without reference to specific companies or products. This report will provide clarification as to whether certain information is attributable to market sounding participants or to Cal-ITP.

Caltrans and its regional and local partners conducted this Market Sounding exercise by collecting written information and conducting follow-up interviews about the knowledge and capabilities of various market players and industry professionals. The information outlined in this report represents the individual commercial views and interests of these Market Sounding participants. This report is intended solely for informational purposes and is not to be construed, under any circumstances, by implication or otherwise, as a recommendation for any specific policies, solutions or services.

Executive Summary

The California Integrated Travel Project (Cal-ITP) aims to make it easier to use public transportation by offering seamless trip planning and payment across modes and across services in California, wherever the rider wants to travel. Cal-ITP aims to partner with both public transportation agencies and the private sector in order to achieve this goal.

The challenges that face the public sector and public transportation agencies when delivering integrated transit are reasonably well known. However, what the private sector needs in order to help the public sector solve these problems has not been well understood in California prior to this effort. To address this knowledge gap, the California State Transportation Agency (CalSTA), Caltrans, and its public transit partners, acting through the Cal-ITP Steering Committee,¹ have conducted a **Market Sounding** with the payments industry in order to gather input from small or start-up firms as well as established, global companies in the marketplace.

The main focus of the Market Sounding is the payment phase in a journey: How might a collaborative state-supported and statewide effort simplify and remove friction from fare payment in California? The Market Sounding addressed: (1) the objectives and goals of Cal-ITP, (2) equitable access, (3) market capabilities and appetite for supporting travel payment and payment integration generally, (4) methods to support public transportation operators, (5) state-of-the-art standards and technologies, (6) statewide roles, (7) commercial opportunities, and (8) customer convenience.

Throughout August and September 2019, Cal-ITP engaged with industry through a Market Sounding event, a questionnaire, and interviews. Twenty-four companies participated (see Table 1) by responding to the project's questionnaire, contributing their vision and understanding of enabling seamless payments in the California transit and wider mobility system, and further elaborating during follow-up interviews.

The findings reported below address not only the most commonly-mentioned observations, but also specific suggestions and insights that are valuable to Cal-ITP and its stakeholders. A notable result of this Market Sounding process is the very positive response of industry respondents to the Market Sounding process itself, and Cal-ITP's commitment to continue interacting with the industry.

¹ The Cal-ITP Steering Committee: Gillian Gillett, Caltrans; Chad Edison, CalSTA; Kyle Gradinger, Caltrans; Jim Allison, Capitol Corridor Joint Powers Authority; Josh Shaw, California Transit Association

Overall insight: A market in flux

The market of payments is changing rapidly. Customer expectations have changed as a result of exposure to the superior user experience in mobile (smartphone) payments, and due to the convenience of door-to-door journey services provided by mobile apps, platforms and shared mobility service providers. The Market Sounding exercise exemplifies this trend: The vast majority of interest and responses came from the financial services industry, the mobile phone industry (including platform and app developers), and start-ups. Market players that have been serving most customers for the past several decades were only one-third of all interested and responding organizations.

Help public transportation agencies accurately implement relevant data standards

Above all, many respondents observed that potential statewide initiatives to improve seamless fare payments were second to ensuring statewide availability and accuracy of mobility data such as station locations, routes, schedules, fares and real-time vehicle tracking information. Although a large share of agencies in California have implemented a form of “GTFS”² transit data sharing, in many cases the lack of up-to-date, complete and/or accurate data is a deterrent to private companies reliably providing route-planning information to end users without significant effort to get data to a basic quality and reliability. In other cases, agencies are found to have insufficient capacity or resources to implement GTFS, or lack the onboard hardware providing real-time location services underpinning “GTFS-realtime.”³ In addition, GTFS fare data is optional and not published by all agencies that do publish GTFS, and GTFS itself has limited support for the range of fare structures and fare products found in California.

The following potential measures were suggested by respondents:

- Ensure support to agencies to implement data standards such as the GTFS family,⁴ particularly GTFS-realtime.
- Ensure operators can easily access tools and training on these standards.
- Ensure completeness, accuracy, timeliness and frequency of data through setting minimum standards and certifying implementations against these standards.

² GTFS is the General Transit Feed Specification that defines a common format for public transportation schedules, associated geographic information, and fares.

³ GTFS-realtime is a feed specification that allows public transportation agencies to provide realtime updates about their fleet to application developers.

⁴ The GTFS family comprises, at time of writing, GTFS-static (planned information), GTFS-realtime (actual, current information) and GTFS-flex

Help public transportation agencies implement relevant payment standards

Among the respondents, we find a broad consensus that contactless bank card technology⁵—using contactless credit, debit and prepaid cards—is considered a sound technology approach to enable statewide seamless fare payments. This is despite signals from some of the respondents that accepting these bank cards and mobile payment technologies may not immediately result in decreasing the cost of fare collection, given current low adoption of this payment technology among the transit customer base.

Drive the improvement of existing transit data and payment standards and the creation of missing standards

Respondents recognized that the set of existing data standards does not cover some key technical interfaces between systems in fare payments. One such interface discussed during the Market Sounding interviews is that of “barcode” tickets,⁶ or tickets issued with a mobile app. Many agencies in California have implemented or are considering implementing a mobile app with ticketing capabilities. Without a statewide or global standard, implementations of mobile tickets are proprietary to the vendors, requiring that all sales, inspections and validation of these tickets and tokens are controlled by the same vendor. A standardized format to read and verify these visual tickets and tokens could drive down costs to public transportation agencies and allow easy expansion of ticket sales to and through other digital channels and commercial mobile apps.

The following potential measures were suggested by respondents:

- Standardize barcode ticket and token specifications for transit.
- Standardize interfaces allowing open fare product sales.

Leverage California’s buying power to lower the cost of fare collection

Leveraging the State’s buying power by providing an alternative to individually-negotiated agreements was widely considered an efficient approach to realizing cost savings for agencies. Several respondents pointed out that this approach would also allow agencies to innovate more easily and forego expensive procurement procedures that severely hamper some smaller agencies.

⁵ This technology is a set of derivatives of the EMV-standard, created by Europay, Mastercard and Visa, maintained and developed by EMVco

⁶ Tickets that are validated with a barcode that can be scanned with a barcode scanning device, smartphone, on vehicles, or at a transit faregate.

Companies responded positively to the idea of a statewide payments processor,⁷ or a statewide provider to process non-cash and credit card payments. Not only would this approach leverage California's buying power and scale, but it could also reduce the cost and effort to individual agencies to continually realize value for money in their payment processing contracts.

Additionally, several respondents confirmed that some individual public transportation agencies may not have the expertise, time, or funds to initiate a procurement for an advanced fare payment system. These agencies could leverage California's buying power through framework agreements to procure services and devices that meet global standards for seamless payments.

The following potential measures were suggested by respondents:

- Procure an opt-in, statewide payments processor for mobility services.
- Enter into framework agreements with several vendors of fare payment systems and devices that interoperate in a seamless fare payment system.

Forge partnerships with the private sector

A key finding of the Market Sounding process is the level of candor and trust that can be created if objectives align between government and industry parties. Potential partnerships with Cal-ITP and public transportation agencies are worth exploring. As an example, Cal-ITP may consider setting up an (open) partnership framework that does not rely upon traditional public procurement processes, but uses the experiences gained in successful public-private partnerships to align private incentives with statewide objectives.

Consider statewide systems which reduce the cost of special local programs

Many respondents—and most significantly, the existing system integrators—advocated for California to realize a statewide platform to process fare payments. However, most respondents also asserted that California should allow significant freedom for local agencies, particularly around fare policy. Across interviews, a picture emerged of a “central digital repository,” or an account management system for each customer's travel discounts, concessions, and certain preferences. This repository could be used to verify the eligibility for free or reduced fares in transportation, and manage concession programs such as those for students, seniors, anyone employed at a company that offers transit discounts, and users with low incomes or with disabilities. This repository potentially reduces both customer and transit agency time, effort, and costs to onboard and manage these programs. In

⁷ A payment processor handles the money from the customer and deposits it to a merchant account or an account managed by a third-party.

addition, a central repository could be used for fare calculation and take into account customer concessions, products and payment methods.

In order to instill trust in such a central system, Cal-ITP was made aware of emerging technologies that support privacy-by-design principles to ensure data privacy and security for Californians through implementing secure, advanced frameworks compliant with the California Consumer Privacy Act.

Linked to this account management system is the suggestion by several respondents to issue identifiers that could be linked to the statewide customer account. These identifiers could take form of closed loop contactless EMV cards and/or as a barcode.

The following initiatives were suggested by respondents:

- Implement a statewide account system.
- Issue identifiers to customers linked to a statewide account.

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Glossary

Name	Description
Account Based Ticketing	Account Based Ticketing is a fare payment system architecture that uses a back office to apply relevant business rules and determine the fare.
API	An Application Programming Interface is a set of routines, protocols and tools for building software applications.
Automated Vehicle Location (AVL)	A system that tracks vehicle locations continuously.
Be-in/Be-out	A method of fare payment validation where the right to travel is autonomously granted to the customer upon vehicle/station entry, and automatically ended upon alighting/exiting, using location data from a mobile phone and sensors or beacons (without tapping or scanning).
Tap-in/Be-out	A method of fare payment validation where granting the right to travel requires customer action (i.e. tap a card, open an app), and is automatically ended upon alighting/exiting.
CCPA	California Consumer Privacy Act is a consumer protection bill that becomes effective on January 1, 2020.
Closed loop payments	Closed loop payments are payments between the customers of a bank or entity running the payment system and merchants that have a contract with the entity. The Clipper card, TAP card and American Express are examples of closed loop payments.
EMV	A technical standard for payment media and payment terminals initiated by Europay, Mastercard and Visa.
cEMV	Initiated by Europay, MasterCard and Visa, EMV is a global standard for the communication between a payment card and a payment terminal or ATM,

Name	Description
	maintained by EMVCo. Contactless (cEMV) is a derivative of EMV for contactless media.
Fare media	A medium used to pay the fare. Typically is used to refer to a closed loop payment card such as Clipper and TAP. Can also refer to traditional paper tickets, mobile tickets, etc.
Fare vending machine	A machine that sells fare media and/or supports topping up fare media.
GDPR	General Data Protection Regulation is a European consumer protection regulation in effect since May 25, 2018
GTFS	General Transit Feed Specification is an extensible standard that allows public transportation agencies to publish their timetables, certain geospatial information (such as stop locations) and fare data in a format that can be consumed by a wide variety of software applications. Currently comprising GTFS-static, GTFS-realtime and GTFS-flex. GTFS-static pertains to planned transit services; GTFS-realtime to actual services, taking deviations into account; and GTFS-flex to on-demand transit services.
Interface	A shared boundary across which two or more separate components of a computer system exchange information, or across which a human and a computer exchange information.
Interoperability	In the context of fare payments, this refers to the ability of a fare media, fare product or payment method to be accepted across different transportation services.
Journey	One or more trips using one or more modes of transportation (including private cars, bikes, walking) to go from the point of origin to the destination.
MDS	Mobility Data Specification, a technical specification for real-time information from shared use mobility providers, initiated by Los Angeles Department of Transportation.
MPDS	Mobility Price Data Specification, a technical specification proposed as an extension to GTFS allowing more complex transit fares to be modeled.
MVP	Minimum Viable Product, a development technique in which a new product is developed with sufficient features to prove the concept and win early adopters.

Name	Description
NeTEX	NeTEX is a European Committee for Standardization technical standard for exchanging public transportation schedules and related data, more encompassing and complex than GTFS.
Open loop payments	Open loop payments are payments between the customers of any issuing bank with the merchants connected to any acquiring bank, provided that both issuing bank and acquiring banks belong to the same payment scheme (i.e. Visa, Mastercard).
Payments processor	An entity that processes payment transactions.
PCI-compliant	Standards that are maintained by the Payment Card Industry Security Standards Council are met when a process or device is PCI-compliant.
PCI-DSS	Payment Card Industry Data Security Standards are a set of information security standards to protect payment transactions, card information and consumer data.
PCI-P2PE	Payment Card Industry Point-to-Point Encryption is one of the standards in PCI-DSS.
Transmodel	Transmodel (EN 12896) provides an abstract model of common public transportation concepts and data structures that can be used to build many different kinds of public transport information systems, including timetabling, fares, operational management, real-time data, journey planning, etc. NeTEX is a derivative of a subset of Transmodel.
Token	A digital secure identifier linking to a customer.

1. Introduction

California is one of the leading economies in the world, home to many of the private sector's new mobility and platform innovators, as well as the largest and most complex public transportation system in the United States.

Public transportation is foundational to making cities work and meeting California's environmental and social goals. Today, California residents and visitors face a disaggregated public transportation network that: is often not as user-friendly as it could be; is costly to operate; faces new competition for riders in many places; and is subject to changing customer expectations around convenience. Further public transportation investments in the State are subject to the same problems unless public transportation integration is promoted. To address these existing problems, and to improve the mobility system, the California State Transportation Agency (CalSTA), California Department of Transportation (Caltrans), and intercity rail and local transit partners are engaged in an initiative to facilitate easy and accessible travel planning and payment across California. The California Integrated Travel Project (Cal-ITP) is dedicated to making travel simpler and cost-effective for all, and to ensuring statewide benefits from collaboration.

1.1 Purpose of this Market Sounding

The goal of this Market Sounding is to enlighten Cal-ITP and its partners on what government might do to encourage industry investment in standardized solutions for public transportation and mobility. This Market Sounding exercise provided an opportunity for a structured dialogue between the private and the public sectors at the early stages of Cal-ITP. The Market Sounding not only tested the viability of the project's objectives, it also obtained feedback on how aspects of the project should be defined to ensure private sector participation and foster competition. In addition, the Market Sounding process helped to build understanding of Cal-ITP and demonstrate that California is committed to meeting the goals of the project. As the market is rapidly changing, it was critical to host this Market Sounding now in order to understand current best practices from a wide variety of companies.

CalSTA, Caltrans, and Cal-ITP's rail and transit partners, acting through the Cal-ITP Steering Committee, conducted a Market Sounding exercise in order to gather input from small and start-up firms as well as established, global companies in the marketplace with respect to: (1) the objectives and goals of Cal-ITP, (2) equitable access, (3) market capabilities and appetite for

supporting travel payment and payment integration generally, (4) methods to support public transportation operators, (5) state-of-the-art standards and technologies, (6) statewide roles, (7) commercial opportunities, and (8) customer convenience.

Caltrans and its regional and local partners conducted this Market Sounding exercise by collecting written information and conducting follow-up interviews about the knowledge and capabilities of various market players and industry professionals. The information outlined in this report represents the individual commercial views and interests of these Market Sounding participants. This report is intended solely for informational purposes and is not to be construed, under any circumstances, by implication or otherwise, as a recommendation for any specific policies, solutions or services.

1.2 Objectives of Cal-ITP

Cal-ITP was established to help California deliver on statewide goals of increasing ridership, improving the customer experience of travel, reaching environmental targets, lowering transportation-related costs for public transportation service providers and the traveling public, and promoting equity throughout the state's vast transportation network.

Cal-ITP can raise the quality of the public transportation experience and shape the next generation of public transportation. There are currently dozens of disjointed steps to taking a trip on mobility services that can generally be grouped into four major phases: (1) Trip planning, (2) Payment, (3) Journey, and (4) Post-journey. Due to the complexity of these opportunities, they cannot be addressed at once. The main focus of this Market Sounding is the payment phase in a journey: How might a collaborative state-supported and statewide effort simplify and remove friction from fare payment in California?

This Market Sounding Report summarizes industry feedback about Cal-ITP, its objectives, preliminary assumptions, and new or innovative approaches or solutions from the market.

1.3 Cal-ITP payments assumptions

Through initial research and analysis, Cal-ITP developed some early assumptions about what the best approach would be for public transportation payment system integration across California. These six assumptions were tested in this Market Sounding process:

Assumption 1: A statewide payment platform may be needed.

- Costs for public transportation agencies and for customers could be reduced through simplification, economies of scale, and the adoption of global standards and practices.
- Customers should have access to a consistent, statewide option for trip planning, payments, and other relevant services (e.g. wayfinding, discounts). This could be a new platform or an existing platform with statewide extensibility.

Assumption 2: The scope of a statewide platform should be such that the goals can be achieved with minimum state-level intervention.

There are many roles in the payment system (see Figure 1 below) and for each role the State of California could be involved at one of the following levels:

- Create regulations and provide standards for other entities acting in the role.
- Provide framework agreements with one or more vendors acting in the role, leveraging statewide buying power to the benefit of public transportation agencies.
- Take the role and outsource the responsibility to a vendor.
- Take on the role and operate the role itself.

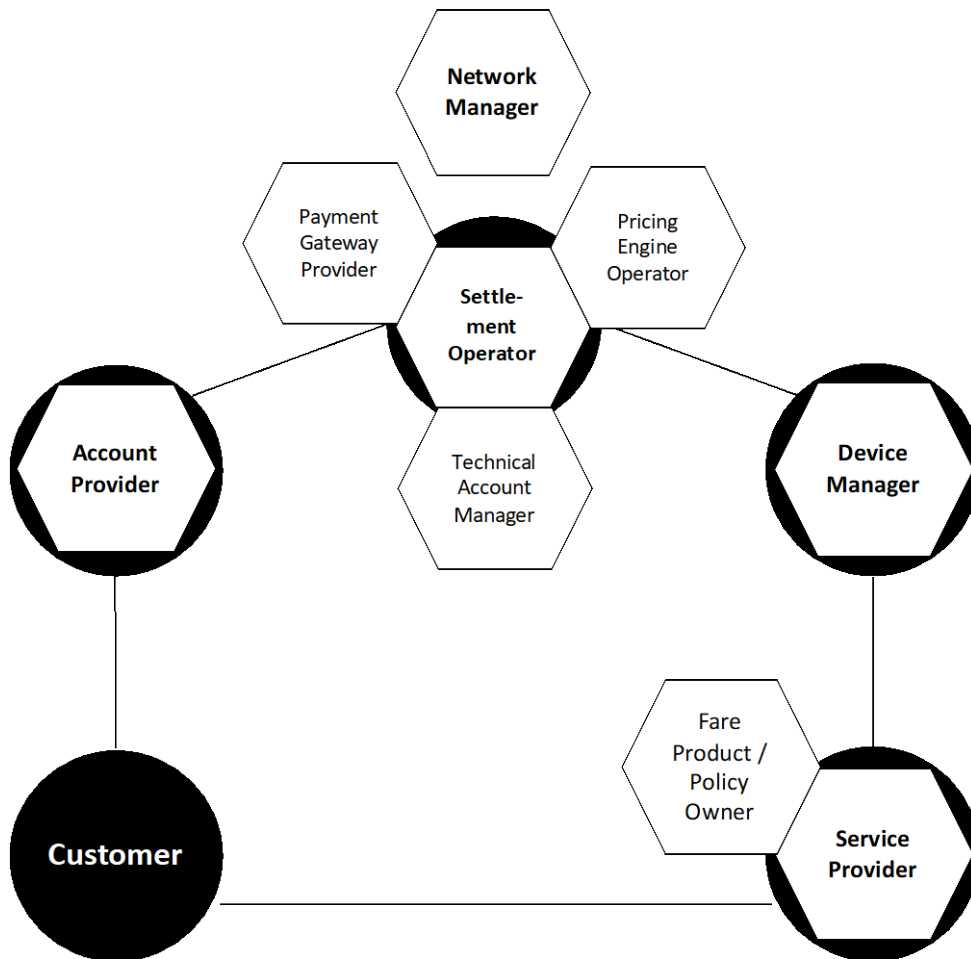


Figure 1: Roles in Fare Payment System

The roles that Cal-ITP recognizes in a fare payment system are depicted in Figure 1 above, and summarized as follows:

- The **Customer** has an account with an **Account/Payment Provider** and pays for services by the **Service Provider** through its relation with the Account/Payment Provider. The Customer has a digital token (e.g., a contactless card, a bank card, or a digital wallet) in a mobile phone to initiate the payment transaction with the Service Provider.
- The Account/Payment Provider issues digital tokens to Customers, provides customer service related to payments, and may ensure a retail network for fare products and top-ups. For acceptance of open loop payments, a single Account/Payment Provider could provide customer support services and ensure a connection to the payment networks of the credit and debit card networks. The Account/Payment Provider may receive enriched transaction data from the Technical Account Manager for each of the payment media and tokens linked to its customer accounts. There may be multiple Account/Payment Providers in the system.

- The **Settlement Operator** settles payments between Payment Providers and Fare Product/Policy Owners (or those Service Providers designated as recipients by the Fare Product/Policy Owner). The Settlement Operator may have the following supporting roles:
 - The **Pricing Engine Operator** is responsible for journey reconstruction and determining the price of the journey in accordance with the fare rules.
 - The **Technical Account Manager** records the activity of payment media and digital tokens issued by an Account/Payment Provider for the purposes of journey reconstruction and price calculation.
 - The **Payment Gateway Provider** ensures that payments are processed through selected Account/Payment Providers.
- The **Device Manager** is responsible for providing and maintaining the front-end payment devices such as fare gates, validators and ticket vending machines for, or on behalf of, the Service Provider. In an interoperable payment system, there may be multiple Device Managers.
- The **Service Provider** is the public transportation service provider or private mobility operator that is responsible for providing a transportation service. The Service Provider provides a transportation service to a Customer and accepts payments from Customers. An ancillary role of the Service Provider is that of the **Fare Product/Policy Owner**. This role is responsible for setting fare rules and/or owning or managing fare products and concessions.
- The **Network Manager** sets and maintains the standards, ensures certification and regulates the entry and exit of respondents to ensure the privacy, security, interoperability, integrity and confidentiality of devices, systems and data.

Assumption 3: Platforms should be open to as many transportation services as possible (public transportation, private transportation, shared mobility, etc.).

- Integrated services would make it easier for customers to make trips that involve multiple transportation services which are geographically adjacent or connected.
- Customers should be able to compare the primary modes or providers available for a given trip.

Assumption 4: Platforms should support open loop payments and allow customers to pay for a service with a mechanism that can be used anywhere payments are accepted.

- Open loop payment would allow for a more seamless journey between different systems.
- Open loop payment would be compatible with mobile solutions (e.g., mobile wallets such as Apple Pay, Google Pay or Samsung Pay).
- Customers using open loop payments would be less reliant on fare vending machines to purchase or reload fare media.
- With open loop payments, new riders or visitors to California could use their own payment media, and the correct fare could be taken with no residual value left on a card or secondary account once a trip is complete.
- Open loop payment would be useful for agencies that do not already have a payment gateway.
- Open loop payment could be expanded to non-public transportation payments.

Assumption 5: Platforms would include support for existing and/or future payment systems and other media and technologies as well.

- Enabling the use of existing account based payment systems could create a funding source for integrated journeys in California.
- There could be support for alternative payment account(s) in the platform itself.
- Unbanked users or infrequent customers may be served by technologies or other platforms that work independently of the banking system or specific mobile technology; the platform should be agnostic of the manner of identification and payment.

Assumption 6: Public transportation operators across the state could use a shared payment processor for many transactions.

- A statewide payments processor would reduce costs to public transportation agencies by providing an alternative to individual, expensive and outdated fare collection systems.
- A statewide processor would leverage the power of integration and scale.
- A statewide payment processor could provide all the functions and equipment necessary to support a statewide, open payments system including: payment processing services, accounting and settlement services, fare validators, and related equipment.

1.4 Criteria for an integrated payment solution

Cal-ITP believes that any payments solution for California would have to meet several criteria, which were shared with Market Sounding respondents for feedback.

Use global standards

Historically, the default solution for transit payment systems has been for each service to build proprietary technologies customized to fit the unique needs and fare policies of that service. This has proven to be inflexible for adapting to changes in consumer expectations, fare policy, technology, newer business models, or the addition of new system components.

Serve all customer groups

Cal-ITP needs flexible and targeted fare payment solutions that serve different user categories based on their travel patterns, willingness and ability to use alternative modes, and a user's financial means (banked, underbanked, unbanked, etc.). As a public project, Cal-ITP has a responsibility to help all Californians, not only some.

Improve equity and accessibility for people

Access to reliable and affordable transportation is essential to address poverty, unemployment, health and wellness, education, and a variety of other social issues. Cal-ITP must address how groups who are most disadvantaged can benefit and be provided accessible and more financially beneficial transportation payment and trip planning solutions than they have had in the past, in such a way that the solution can scale and be cost-effective at a statewide level.

Integrate payment and trip planning

The experience of trip planning and purchasing should have more accuracy, ease, accessibility and lower cost to consumers. Trip planning and payment solutions should be able to address local, regional and inter-regional journeys.

Scale up from a Minimum Viable Product (MVP)

Solutions should be able to satisfy early customers and provide valuable testing of both technology and business models. Feedback collected from early deployments should allow for the solution to be improved and scaled up to more places, services, and customer groups.

2. Market Sounding process

On August 9, 2019, Caltrans and Cal-ITP distributed a Market Sounding document to companies and organizations in the payments and trip planning industry and published the same document through the Caltrans website. Interested parties were invited to a Market Sounding kick-off event on August 15 in San Francisco. During this one-hour event, CalSTA Chief Deputy Secretary for Rail and Transit, Chad Edison, provided the background and objectives of the Cal-ITP project, after which Cal-ITP consultant Jeroen Kok introduced the setting and process of the Market Sounding event (Appendix 1). Thirty-eight people were present at the kick-off event and another 41 people joined the live video feed. The companies and institutions that participants represented are listed in Appendix 3. All attendees were provided the opportunity to ask questions via Caltrans' website and a dedicated email address at Caltrans through August 20. On August 23, a final amendment to the Market Sounding document was released (Appendix 2) and submissions from private sector companies were received on August 30.

2.1 Market Sounding respondents

The following organizations, listed in alphabetical order, submitted a Market Sounding response:

Market Sounding Respondents
Arup / Transport for London (TfL)
Axon Vibe, Inc.
Bytemark
CCV Group
Conduent
Cubic Transportation Systems
Delerrok, Inc.
DoubleMap
FortifID
Littlepay
Masabi
Mastercard
moovel North America
MSI Global
Octopus Cards Limited
Scheidt & Bachmann USA, Inc.
Thales Group

Market Sounding Respondents
Token Transit
Transit App
Visa, Inc.
Vix Technology

Table 1: List of companies that submitted Market Sounding Responses

2.2 Interviews and analysis

The Cal-ITP team and consultants held interviews with all the parties that submitted a response. These interviews were held between September 16 and October 4 under Chatham House rules⁸ to foster greater candor from the respondents. Each of these interviews generally followed the topics laid out in the Market Sounding document.

After finalizing all the interviews, a panel of technical consultants compiled the key findings reported in the sections below. The key findings constitute those views and opinions of respondents that are either: broadly shared by respondents, a sharp contradiction of what Cal-ITP assumed, are directly relevant to meeting Cal-ITP objectives, or have otherwise been found relevant to the reader by the panel.

The findings are structured as follows:

- Section 3 describes relevant market feedback on the Cal-ITP objectives.
- Section 4 describes barriers respondents perceived to achieve Cal-ITP objectives.
- Section 5 presents the initiatives suggested by respondents to meet objectives and overcome barriers.

⁸ When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.

3. Key Findings: Support for Cal-ITP objectives

All respondents that commented on the Cal-ITP objectives agreed with the objectives set out by Cal-ITP in Section 1.2. There were several additional Cal-ITP objectives suggested by Market Sounding respondents, including:

- Provide flexibility and the opportunity to link mobility services of all types and other programs via a common payment platform.
- Be able to provide a technical architecture and framework to allow sharing of personal data that is compliant with relevant regulations such as CCPA.
- A shared platform for fare calculation and payment processing using an account based ticketing (“ABT”) philosophy.

Most respondents indicated that two more perspectives on transit should be considered in order to achieve the Cal-ITP objectives. First, respondents indicated that people want a compelling public transportation service offering: substantial improvements in first-and-last-mile connections to transit, increased density of the transit service network, and greater frequency of transit services. Improvements of payments and trip planning were generally regarded as necessary but without substantial impact on their own. Second, respondents with experience in California stated that the lack of a simple fare structure would continue to impact the customer experience even if the quality of transit services and associated trip planning and payments were substantially increased.

4. Key Findings: Barriers to achieve Cal-ITP objectives

As part of the Market Sounding process, respondents were asked what they believed the barriers are to achieving the objectives of Cal-ITP. The following sections describe these barriers.

4.1 Existing landscape of hardware and software solutions

The landscape of payment systems across public and private mobility services is fragmented and varied, spanning cash-only collection boxes, physical tokens and tickets, contactless tap-to-pay systems, and all-digital app-based solutions. Even when focused on fixed-route public transit and passenger rail, there is an extensive range of payment solutions in use to meet the needs of different users.

Cubic Transportation Systems, a U.S. based systems integrator, has developed and maintains the mass transit fare payment systems for the two largest population centers in California. Between the San Francisco Bay Area and Los Angeles, Cubic currently serves approximately 50% of California's population with the Clipper and TAP contactless smart card programs, respectively. These large existing transit payment systems are comprised of numerous systems with separate merchant acquirers and payment processing partners. Clipper and TAP are not designed to facilitate interoperability, or to scale statewide to include small transit operators. Many agencies statewide also have a multitude of independent mobile ticketing applications, including many agencies also served by Cubic in the Bay Area and in Los Angeles.

4.2 Quality and reliability of existing mobility data

Although a large share of agencies in California have implemented a form of "GTFS" transit data sharing, in many cases out-of-date, incomplete and/or inaccurate data is a deterrent to private companies reliably providing route-planning information to end users without significant effort to get data to a basic quality. In other cases, agencies are found to have insufficient capacity or resources to implement GTFS, or lack the onboard hardware providing real-time location services underpinning "GTFS-realtime." In addition, GTFS fare data is optional and not published by all agencies that do publish GTFS, and GTFS itself has limited support for the range of fare structures and fare products found in California.

Transit operations divisions at public transportation agencies are often responsible for providing up-to-date data to the customer. However, mobility data standards such as GTFS-realtime have lacked well-specified requirements and validation tools. This results in confusion and disagreements between public transportation agencies, Automatic Vehicle Location (AVL)

vendors, and application developers as to what data should appear in a GTFS-realtime feed. Consequently, this increases the time, effort, and cost to deploy a new GTFS-realtime feed and can result in errors in real-time info that confuses riders and operations.

4.3 No standards in place for a uniform fare policy

Fare policy defines how much people pay to use public transportation and includes a number of factors: fare structure (how the price of a ride is set), price, payment options, and discount categories. California has hundreds of public transportation services, nearly all of which set their own policy for determining the fares they will charge and the fare products they will offer. This has led to tens of thousands of different fare structures, passes, and prices throughout California.

Disparate and disjointed fares create customer confusion, discourage people from using more than one transit service and undermine the benefits California's regions should derive from the significant investments they are making in new transit infrastructure, service and fare payment technology. Fare policy integration is highly demanded by passengers who use multiple transit systems on a regular basis, but was also a standardization requested by market sounding participants who identified that simpler fare policy would benefit any statewide integration efforts.

4.4 Many public transportation agencies have existing long-term contracts

Many public transportation agencies have long-term contracts with system integrators, payment gateways, and other hardware, fare payment and financial vendors. Some agencies are beholden to these agreements and associated aging equipment. Additionally, validation equipment cannot be easily upgraded without costly "upgrade" contracts, and contracts have typically not been tailored to allow smooth migration to a new vendor or provide for sufficient openness to allow the integration of other vendors into the system. Integrating a solution within a disparate hardware environment may be extremely difficult.

4.5 Cost implications

Respondents alluded to potential barriers to roll-out open loop payments in California due to ongoing costs of accepting open loop payments in transit. To solve this requires conducting a rigorous exercise with bank consortia, including issuers and the global payment systems, and would likely require an agreement on the business model; discussion on the technical, functional, and financial implications and who absorbs them; agreement on aggregation and settlement framework; and negotiation on transaction fees. One market sounding respondent stated that the costs to accept open loop

payments in the U.S. are greater than traditional closed loop fare payment systems due to the payment processing costs of open loop transactions—even with the approach of aggregating transactions at the end of a customer's journey. The preference, historically, for closed loop systems is derived from lower payment processing costs and the needs of most transit operators to consider fare recovery and operating expenses in addition to their fare policies when developing their budgets.

There are also other cost implications involved with the adoption of EMV technology. There are significant licensing fees for EMV through an EMV consortium. In addition to licensing fees, there are currently no suitable API services to develop a virtual EMV card, and it is costly where it can be done.

According to some of the respondents, some public transportation agencies spend a lot of money to collect fares but are short on operating budget to implement changes to their fare payments systems. A barrier may be their ability to pay certain fees related to the adoption of new technologies and capabilities.

4.6 Political risks

Respondents identified risks with the complexity of building a cohesive and lasting statewide agreement on the overall approach that would meet Cal ITP's objectives. The success of Cal-ITP will rely on creating, maintaining, and supporting the alignment and governance of multiple parties and thus creating a platform for coordinating with the private sector. Those agreements among agencies could stretch across a wide range of topics, including procurement, payments processing, data standards, revenue sharing, customer information, and even service planning.

Respondents noted that for many reasons, public transportation agencies have difficulty taking on risk and are often critiqued for doing so. They have also traditionally been late adopters to new technologies. As political leadership changes over time, the priorities of public transportation agencies can also shift, which make it difficult to follow through on an approach to transit integration and public-private partnership. Each agency will need assurances on a certain number of critical factors before committing to changes, and will need assurances that revenue will not diminish with participation in integrated platforms.

4.7 Integration of public and private mobility services

Facilitating integration with private mobility services, both technically and from a business agreement perspective, may pose as a barrier to the success of the project. Each integration will likely have its own nuances and each

third-party will have its own desired business rules (i.e., remittance, payment integration, data sharing, etc.).

Public transportation agencies also have a multitude of independent mobile ticketing applications. Any integration efforts across multiple agencies would require integration of fare rules, transfer rules, back office systems, reporting, reconciliation and customer service.

Managing the transition away from existing ticketing solutions will take careful planning, commitment, and openness from agencies to make it successful. There will be multiple moving parts, temporary integrations and interfaces, transitional periods, phased implementation plans, and much more involved.

5. Key Findings: Potential initiatives that Cal-ITP could deploy

Market Sounding respondents provided substantive ideas regarding initiatives which are necessary to contribute to program objectives. The initiatives suggested, and described in the sections below, were reviewed to ensure that they fulfill the objectives of Cal-ITP, as outlined in Section 1.2 of this report.

The initiatives outlined below also inform the roles the State of California could play in ensuring a secure, extensible platform that is open to all transportation services and supports open-loop payments, leveraging a single payments processor. All respondents agreed that the State must take one or more roles in order to achieve the program's objectives. In addition to the initiatives below, respondents agreed that the State should identify policy changes and policies that would help re-establish the goals of public transit in the State of California in order to be consistent with Cal-ITP goals and other statewide goals.

5.1 Promote existing data standards

Respondents largely indicated that the implementation of GTFS by all public transportation agencies in California is a prerequisite to providing seamless fare payments. They indicated that smaller agencies may lack the resources and tools to implement GTFS. Even if GTFS is made available by an agency, respondents reported that these data feeds often lack the accuracy and timeliness required for consistent trip-planning and wayfinding. Suggestions from respondents to overcome these issues include:

- Create GTFS implementation guidelines with accuracy and completeness requirements.
- Provide GTFS technical assistance to agencies through training and materials.
- Assist agencies procuring AVL systems with GTFS feeds.

Other standards or specifications that have been mentioned by respondents are the following:

- MPDS – a potential extension to GTFS supporting complex fare types
- MDS – a specification for data sharing by shared use mobility providers
- Transmodel – a European standard defining transit data elements
- NeTEX – a European standard based on Transmodel for back office communications
- PCI-P2PE – a standard that may be applied in open loop payments
- PCI-DSS – a standard that must be applied in open loop payment

5.2 Agree on standards for app-based mobility payments

In addition to existing data standards, over half of the respondents indicated the need to develop new standards or amend existing standards. Especially now that more and more agencies are gaining experience with mobile ticketing apps, respondents acknowledge that the lack of standardization creates barriers for other app developers creating apps in California. As such it may be reasonable for Cal-ITP to first focus on standardization of mobile barcode technology and ticket sales APIs before promoting the app-based barcode technologies.

Development and subsequent implementation of these standards would ensure that any mobile app would be able to sell tickets or top-up accounts of any transit agency in California, and that any validation device, such as barcode scanners on-board vehicles, would work with all mobile apps.

5.3 Promote EMV as a technology approach for statewide interoperability

The contactless EMV standard allows for open loop payments in transit using customers' regular credit, debit and prepaid cards (and mobile payments) as well as closed loop contactless EMV cards. Overall, the majority of respondents agreed that contactless EMV payments, on the mid-term, would be the most likely statewide common payment method, and that the contactless EMV technology stack underlying these bank cards could be leveraged to accept closed loop EMV-compliant cards. However, respondents with operational experience in open loop acceptance in transit do point out that there are currently several limiting factors to successfully deploying EMV technology statewide:

- The cost of processing financial payment transactions may increase due to the fixed dollar component in the interchange fees.
- The share of unbanked/underbanked transit patrons in most regions is very high, limiting the benefits of open loop payments to a limited group of customers: those who do not currently use transit.
- There are licensing costs associated with deploying EMV-compatible cards, decreasing the apparent attractiveness of EMV-compatible closed loop cards in relation to the existing closed loop card technologies.

5.4 Leverage state buying power to procure a financial processor

As cost is one of the barriers of several innovative actions in the field of payment systems, the respondents agreed on the benefits of leveraging California's buying power. That way, agencies may save the effort and cost of procurement, as well as get access to the economies of scale realized by California. The added benefit is that California can ensure that through these

procurements and framework agreements, all relevant data and payments standards are realized.

Many agencies in California process some form of digital payments received from customers. However, a large share of agencies may not have the capacity nor the scale to achieve a competitive price. By using California's scale and aggregating all payment transactions processed in California, acquiring and processing fees may be significantly reduced for a large number of agencies.

5.5 Promote digital payment methods that reach people who are unbanked and underbanked

Cal-ITP needs flexible and targeted fare payment solutions that serve different user categories based on their travel patterns, willingness and ability to use alternative modes, and a user's financial means (banked, underbanked, unbanked, etc.). As a public project, Cal-ITP has a responsibility to help all Californians, not only some.

Serving unbanked transit riders means considering both when the transit fare payment card is initially sold and during the life of the card, when additional fare value is sold. Respondents indicated that dual-purpose agency-branded transit prepaid cards can serve the unbanked and underbanked segments of the population. These prepaid cards can also help unbanked and underbanked customers to engage in banking commerce beyond transit usage.

5.6 Provide technical assistance to transit agencies

Each transit agency is staffed differently and some agencies have very limited capacities to implement changes that will advance the goals of Cal-ITP. Market Sounding respondents strongly identified that California should have a role in providing technical assistance and training related to the initiatives of Cal-ITP.

As part of the technical assistance, Cal-ITP can develop a one-time or phased set of Transit and Intercity Rail Capital Program (TIRCP) grant opportunities or a Statewide program of grant opportunities. Cal-ITP can explore how certain types of funds (e.g., TIRCP or SB1 funding) could be categorized to advance the goals of the project.

5.7 Create a system for agencies to efficiently qualify customers for programs and discounts

Public transportation agencies that offer discounted fare products for certain rider types (senior citizens, students, disabled, low income, etc.) spend significant time and resources to qualify their customers for these programs and discounts. Respondents identified that Cal-ITP can help to use and harmonize existing state databases that contain specific information required for program eligibility such as age, income, disability status, veteran status, etc.

Across interviews, a picture emerged of a “central digital repository,” or an account management system of each customer’s travel discounts, concessions, and certain preferences. This repository could be used to verify the eligibility for free or reduced fares in transportation, and manage concession programs. In addition, a central repository could be used for fare calculation and take into account customer concessions, products and payment methods.

Linked to this account management system is the suggestion by several respondents to issue identifiers that could be linked to the statewide customer account. These identifiers could take form of closed loop contactless EMV cards and/or as a barcode.

With a centralized account management system, California could also leverage other state programs into a potential solution, including EBT, CalFresh (California’s food stamps program), the Department of Motor Vehicles, etc. Solutions should encourage and leverage shared and streamlined enrollment processes, and centralized data to qualify respondents into various age- and income-based programs.

5.8 Centralized procurement with framework agreements

Respondents told us that California should help foster cooperative purchasing opportunities in order to save significant time and money in contract production as well as lower contract prices through the power of aggregation. As a part of this initiative, California can enter into framework agreements with several vendors of fare payment systems and devices that interoperate in a seamless fare payment system.

In addition, many respondents mentioned the need for structuring procurement activities in a way that allows an open market for multiple suppliers. The respondents mentioned the need for openness to the participation of smaller businesses, and constant adoption of innovative practices, therefore creating a procurement framework that encourages more than one large and monolithic contract—rather allowing and

encouraging a variety of vendors to work together to implement a best of breed solution.

Many Market Sounding respondents agreed that California should play a role in creating framework agreements in order to establish terms and conditions governing contracts that may fall under several categories related to Cal-ITP, including:

- Front-end payments hardware
- Central and back-office applications
- Financial processing

5.9 Structure the program for private sector participation

A key finding of the Market Sounding process is the level of candidness and trust that can be created if objectives align between government and industry. The potential benefits of a successful partnership to Cal-ITP and public transportation agencies are worth considering and exploring. The State of California may consider setting up an (open) partnership framework that does not rely upon traditional public procurement processes and instead relies upon public-private partnerships to align private incentives with statewide objectives.

The respondents had little input regarding funding the Cal-ITP program. One suggestion was to create a partnership between private parties and California to advance the implementation of any objectives shared or agreed between the project and private sector. This partnership could come with a funding mechanism for implementations, and agencies could make use of such funds if the use of the funds contribute to agreed objectives.

Appendix 1: Kick-off Event presentation

Separate document

Appendix 2: Final Market Sounding Document and Notice

Separate documents

Appendix 3: List of companies participating at Market Sounding Kick-off Event

Company names as reported by themselves:

Participating Companies/Organizations
18F
AAA A3Ventures
ACI
ARC Alternatives
Arup / Transport for London (TfL)
Axon Vibe, Inc.
Bay Area Council
Bytemark
California Transit Association
Caltrans
Chase
Conduent
Cubic Transportation Systems
DB Systel GmbH
Delerrok, Inc
Ford Smart Mobility
Google
Hopthru, Inc.
IBI Group
IBM
Interline Technologies LLC
Littlepay
Lyft
MaaS Global
Mastercard

Participating Companies/Organizations
McKinsey
moovel North America
MTC
MTC/ABAG
OPERATION E.V.A.C.
San Francisco Municipal Transportation Agency
Scheidt & Bachmann USA, Inc.
Square, Inc.
SwiftFare Pty Limited
Techsoup
Token Transit
Transit
Tranzpayments Consulting
Trillium Solutions, Inc.
Uber
UC Berkeley Transportation Sustainability Research Center
Visa, Inc.
Wells Fargo

Table 2: List of companies that participated at the Market Sounding Kick-off Event