

---

**Innovations Deserving  
Exploratory Analysis Programs**

***Transit IDEA Program***

---

## **Bike Love**

Final Report for  
Transit IDEA Project 99

Prepared by:  
Justine Burt  
Palo Alto Transportation Management Association (PATMA)

***January 2023***

---

**NATIONAL** Sciences  
**ACADEMIES** Engineering  
Medicine

 TRANSPORTATION RESEARCH BOARD

## **Innovations Deserving Exploratory Analysis (IDEA) Programs Managed by the Transportation Research Board**

This IDEA project was funded by the Transit IDEA Program.

The TRB currently manages the following three IDEA programs:

- The NCHRP IDEA Program, which focuses on advances in the design, construction, and maintenance of highway systems, is funded by American Association of State Highway and Transportation Officials (AASHTO) as part of the National Cooperative Highway Research Program (NCHRP).
- The Rail Safety IDEA Program currently focuses on innovative approaches for improving railroad safety or performance. The program is currently funded by the Federal Railroad Administration (FRA). The program was previously jointly funded by the Federal Motor Carrier Safety Administration (FMCSA) and the FRA.
- The Transit IDEA Program, which supports development and testing of innovative concepts and methods for advancing transit practice, is funded by the Federal Transit Administration (FTA) as part of the Transit Cooperative Research Program (TCRP).

Management of the three IDEA programs is coordinated to promote the development and testing of innovative concepts, methods, and technologies.

For information on the IDEA programs, check the IDEA website ([www.trb.org/idea](http://www.trb.org/idea)). For questions, contact the IDEA programs office by telephone at (202) 334-3310.

IDEA Programs  
Transportation Research Board  
500 Fifth Street, NW  
Washington, DC 20001

The project that is the subject of this contractor-authored report was a part of the Innovations Deserving Exploratory Analysis (IDEA) Programs, which are managed by the Transportation Research Board (TRB) with the approval of the National Academies of Sciences, Engineering, and Medicine. The members of the oversight committee that monitored the project and reviewed the report were chosen for their special competencies and with regard for appropriate balance. The views expressed in this report are those of the contractor who conducted the investigation documented in this report and do not necessarily reflect those of the Transportation Research Board; the National Academies of Sciences, Engineering, and Medicine; or the sponsors of the IDEA Programs.

The Transportation Research Board; the National Academies of Sciences, Engineering, and Medicine; and the organizations that sponsor the IDEA Programs do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of the investigation.

# **Bike Love**

## **Transit IDEA Program Final Report**

### **IDEA Project T-99**

*Prepared for*

The Transit IDEA Program  
Transportation Research Board  
National Academies of Sciences, Engineering, and Medicine

*by*

*Justine Burt*

*Palo Alto Transportation Management Association (PATMA)*

*1/31/23*

## Table of Contents

Executive Summary	1
Idea Product	3
Concept and Innovation	5
Investigation (Project Stage 1): Development and Validation of the Research Software Platform	10
Investigation (Project Stage 2): Case Study & Decision Support Tool Kit Design	15
Investigation (Task 5, Stage 2): Program Launch and Analysis	16
Investigation: (Task 6, Stage 2) Program Growth and Measurement	28
Plans for Implementation and Scaling	35
Conclusions and Lessons Learned	37
References	41
Appendix A: Onboarding and Using the Bike Love App	43
Appendix B: PATMA Bike Love Subsidy Application	53
Appendix C: Stage 1 Beta: Commuter Feedback	56
Appendix D: Stage 2: 9/27/2022-11/29/2022 Feedback	68
Appendix E: Responses to Expert Review Panel feedback on first draft final report	73
Appendix F: Research Results	77

## ACKNOWLEDGMENT

Thanks to the Bike Love project team:

- Justine Burt, Principal Investigator, Palo Alto Transportation Management Association (PATMA), paloaltotma.org
- Steve Raney, Principal, North America, Motion, himotion.co (formerly CashByCycling.com). T-99 primary researcher and final report author
- Jose Diaz, Co-founder & CEO, Motion
- Pawel Zawada, Co-founder & CTO, Motion
- Sana Ahmed, PATMA
- Kruti Ladani, Elemental Accelerator

Thanks to our 20 Transit IDEA T-99 project partners: Transportation Research Board, American Public Transit Association, public transit operators (Caltrain, VTA, LA Metro, Commute.org, Austin Capital Metro Transit), Bay Area Metropolitan Transportation Commission (MTC), Caltrain's secure bike storage vendors (BikeHub, eLock, BikeLink), City of Palo Alto, City of Menlo Park, City of Redwood City, a bike shop (Palo Alto Bicycles), regional planning advocates (Silicon Valley Leadership Group), financial technology (fintech) industry leaders (Virtual Incentives, Marqeta, Sutton Bank), and Silicon Valley Bike Coalition.

**TRANSIT IDEA PROGRAM  
COMMITTEE**

**CHAIR**

*SANTOSH MISHRA  
IBI Group*

**MEMBERS**

MELVIN CLARK  
*HATCH LTK*  
LAUREN COCHRON SCOVILLE  
*Proterra Inc.*  
DREW DARA-ABRAMS  
*Interline Technologies LLC*  
SUZIE EDRINGTON  
*Capital Metropolitan Transit Authority*  
AL MARTINEZ  
*Los Angeles County Metropolitan  
Transportation Authority*  
SANTOSH MISHRA  
*IBI Group*  
LOUIS SANDERS  
*Ayers Electronic Systems*  
MANJIT SOOCH  
*Alameda-Contra Costa Transit District*  
JASON STARR  
*Via Transportation*  
DAVID SPRINGSTEAD  
*Metropolitan Atlanta Rapid  
Transportation Authority*  
DAVID THURSTON *Canadian  
Pacific Railway*

**FTA LIAISON**

RIK OPSTELTEN  
*Federal Transit Administration*

**TRB LIAISON**

STEPHEN ANDRLE  
*Transportation Research Board*

**IDEA PROGRAMS STAFF**

CHRISTOPHER HEDGES, *Director, Cooperative  
Research Programs*  
GWEN CHISHOLM-SMITH, *Manager, TCRP*  
INAM JAWED, *Senior Program Officer*  
VELVET BASEMERA-FITZPATRICK, *Senior  
Program Officer*  
DEMISHA WILLIAMS, *Senior Program Assistant*

**EXPERT REVIEW PANEL TRANSIT IDEA  
PROJECT 99**

Sylvia Star-Lack, *City of Palo Alto*  
Toshi Shepard-Ohta, *Metropolitan Transportation  
Commission*  
Lauren Ledbetter, *Santa Clara Valley Transportation  
Authority*  
Dan Provence, *Caltrain*  
Suzie Edrington, *Austin Capital Metro*  
Narayana Sundaram, *APTA*

## EXECUTIVE SUMMARY

For TRB Transit IDEA Project T-99, Palo Alto TMA is implementing a “Bike Love” mobile app that provides daily incentives for verifiable active mode first-mile commute trips to transit and active mode commutes from home to work, up to \$600 per year per commuter. Automated travel mode detection identifies bike, e-bike, e-scooter, and e-skateboard trips. Commute trips are verified to stop or start within geofences at 30 Caltrain (commuter rail) stations and two Palo Alto job centers. Incentive dollars are instantly redeemed at local merchants via reloadable Apple/Google Wallet Virtual Visa cards, a new type of payment card. 67% of incentive dollars are spent in Palo Alto, recycling funds back into the local economy. Six “world’s firsts” have been achieved. Rapid program growth was achieved by a persuade-to-join-program commute survey and via door-to-door outreach to 800 small businesses.

Bike Love provides eight TDM innovations, six are **world firsts**<sup>1</sup> and two demonstrate **national leadership**:

- Daily incentives for verifiable active mode first-mile commute trips to transit (Innovation 1 - **world’s first** bike-to-transit incentives) and active mode commutes from home to work, up to \$600 per year per commuter. (Innovation 2 - the highest US incentive for a non-employer bike program - **national leadership**)
- Automated travel mode detection identifies bike, e-bike, e-scooter, and e-skateboard trips. (Innovation 3 - world’s first commute incentives for e-scooter & e-skateboard modes)
- Commute trips are verified to stop or start within geofences at 30 Caltrain (commuter rail) stations and two Palo Alto job centers. (Innovation 4 - world’s first use of geofences for active mode commute verification)
- Incentive dollars are instantly redeemed at local merchants via reloadable Apple/Google Wallet Virtual Visa cards, a new type of payment card. (Innovation 5 - world’s first use of reloadable Virtual Visa for commute programs)
- 67% of incentive dollars are spent in Palo Alto, recycling funds back into the local economy to multiply program impact. (Innovation 6 – the highest level of local funds recycling in any commute program - national leadership)
- Rapid program growth was achieved by a persuade-to-join-program commute survey (Innovation 7 - world’s first use of persuade-to-join program survey for bike incentives) and via labor-intensive door-to-door outreach to 800 small businesses (Innovation 8 - **world’s first** door-to-door marketing outreach for a bike commute program).

The project’s data and charts provide powerful trend analyses and actionable software product manager insights. Project accomplishments and metrics:

- Successful marketing outreach motivated 106 Palo Alto workers to apply to join the Bike Love program.
- The software team discovered and implemented improved financial technology (fintech), eliminating expected onboarding problems with merchants.
- Travel mode detection was 95% accurate.

---

<sup>1</sup> As far as we know, these are world’s firsts. It is difficult to confirm a world’s first. We both searched the web and queried CUTR’s transp-tdm listserv of 2,000 TDM professionals for counterexamples but found none. We continue to search for counterexamples.

- During the project's Stage 2, there were 158 Virtual Visa transactions at 90 different merchants worth a total of \$2,355 with an average transaction amount of \$14.90.
- 60% of commuters were "retained," meaning they took one or more valid trips during the last two weeks of Stage 2.
- During weeks where commuters took one or more valid trips, an average of 3.8 valid trips were taken per commuter.
- At the end of Stage 2, the average Bike Love participant had an unspent balance of \$9.20 on their Virtual Visa.

The project was overwhelmed by onboarding issues. Only 33 out of 106 commuters completed the entire seven-step onboarding process. For future software releases, numerous improvements to the onboarding process have been identified.

## **IDEA PRODUCT**

### **BACKGROUND AND MOTIVATION**

#### **About Palo Alto TMA**

As far as U.S. transportation management associations (TMAs), the 501c3 nonprofit Palo Alto TMA (PATMA) is the social equity leader, having pioneered low-income worker commute subsidies. The service sector generally experiences high turnover among staff but in Palo Alto, partly because PATMA provides free transit passes for workers making less than \$70,000/year, the amount of time service sector workers who receive passes stay on the job doubled since the start of the program.

PATMA's annual budget hit a high of \$750,000 in 2019, with most of the funding coming from single-occupancy commuters via the City of Palo Alto's University Avenue Parking Fund. In October-December 2019, 333 cars were removed from downtown, 221.0 by the transit pass program, 9.9 by Scoop, 95.1 by Waze Carpool, and 7.3 by the Lyft after-hours program. The TMA is more than twice as cost-effective as adding a new \$33 million downtown parking structure and is more cost-effective than major employer transportation demand management (TDM) efforts, measured by the cost per year of reducing a single SOV commute (this can also be thought of as the cost of freeing a parking space). PATMA serves 800 (mostly small) businesses, encompassing technology, light office, government, and service workers. (1). (2).

Caltrain (commuter rail) has replicated the PATMA transit program model in 14 new locations by creating its Go Pass Donation Program. (3)

#### **Project Software and Fintech (Financial Technology) Partners**

Bike Love project software partner Motion has developed a mobile app commuter platform helping organizations shift commute behavior towards green, active, and micro-mobility modes. Motion simplifies the design and implementation of commuter programs with direct incentives to the employer staff for 'green' commuting. Bike Love is one of multiple commute incentive programs on the platform, which serves North American and European programs.

Virtual Incentives provide the project's fintech software with electronic Virtual Visa cards issued by Sutton Bank. Atlanta Regional Commission's Georgia Commute Options brand was the first U.S. TDM organization to partner with Virtual Incentives, but PATMA is the first to use the Virtual Visa feature. (4).

#### **Project Motivation and Supportive Local Policy**

PATMA's GIS analysis supports the potential for "active first-mile" programs to scale. Eighty percent of PATMA's target commuters live within three miles of the major transit pipelines in Palo Alto such as Caltrain, El Camino Real buses, and the Dumbarton Express bus. (5).

Caltrain has undertaken an ambitious program to increase first-mile biking to Caltrain by installing more than 330 electronic bicycle lockers at 22 stations. Caltrain has funding for hundreds of additional e-lockers.

This effort gives commuters a secure place to park their bike, increasing Bike Love’s chances of success. Pre-pandemic, Caltrain was overflowing with bikes on trains and sometimes prevented cyclists from boarding due to full capacity. Because Palo Alto job sites typically require only a three-block walk to work from Caltrain (six blocks is about the maximum), the majority of bike-plus-Caltrain commuters will park their bike at Caltrain, rather than bring the bike on board a train.

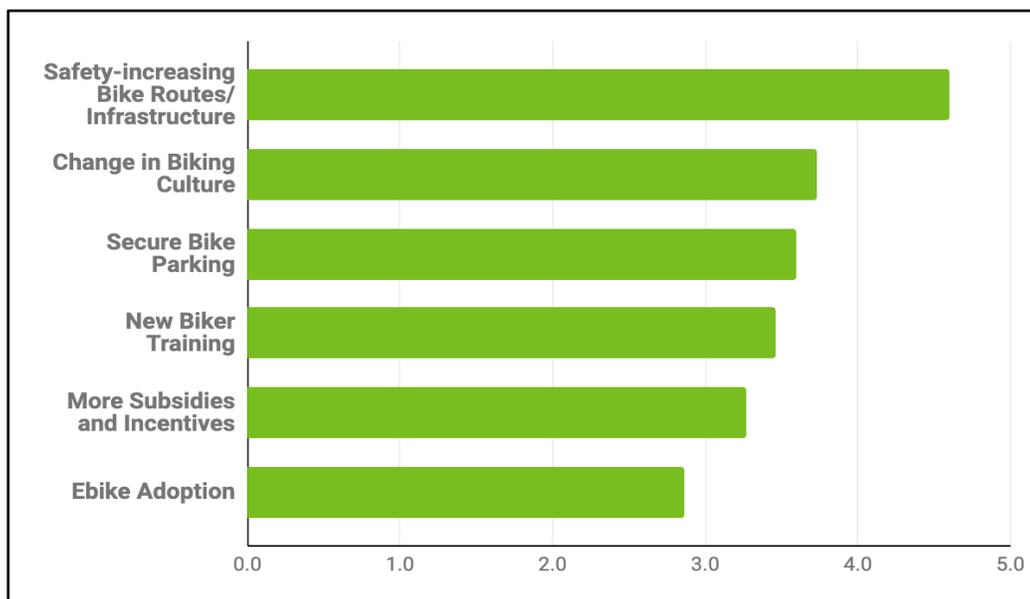
From a City of Palo Alto policy viewpoint, the City’s 2012 Bicycle + Pedestrian Transportation Plan has an unrealized goal to double bike commute trips, and Bike Love may help achieve that goal. (6). The City’s Sustainability & Climate Action Plan also supports increased biking as over 50% of the City’s remaining greenhouse gas emissions are from road travel.

### What Will It Take to Make Biking Take Off in the Bay Area?

Bike commute incentives that Bike Love provides are only one of six key elements that can increase bicycle commuting. The Bike Love project kickoff meeting was held on 2/16/2021. At the kick-off meeting, attendees were polled about factors that would popularize biking in the Bay Area, with factors taken from a previous webinar on the topic. (7).

Nine kickoff meeting attendees responded to poll #1 on a scale from 1.0 for not important to 5.0 for extremely important. The weighted average of the nine responses was calculated and showed that improved bike infrastructure was the most crucial element, followed by a change in biking culture (Figure 1). Attendees agreed that subsidies are useful to incentivize a cultural shift in biking. The group agreed that making Single Occupancy Vehicles (SOV) less desirable will increase the mode shift to biking. An example of this has already occurred in Europe, where a robust pro-biking legal framework combines with more-costly SOV driving.

Figure 1: Results from poll #1: What will it take to make biking take off in the Bay Area?



## CONCEPT AND INNOVATION

### BIKE LOVE INNOVATION

For TRB Transit IDEA Project T-99, PATMA is implementing a “Bike Love” mobile app that provides eight TDM innovations, six are **world firsts**<sup>2</sup> and two demonstrate **national leadership**:

- Daily incentives for verifiable active mode first-mile commute trips to transit (Innovation 1 - **world’s first** bike to transit incentives) and active mode commutes from home to work, up to \$600 per year per commuter. (Innovation 2 - the highest US incentive for a non-employer bike program - **national leadership**)
- Automated travel mode detection identifies bike, e-bike, e-scooter, and e-skateboard trips. (Innovation 3 - **world’s first** commute incentives for e-scooter & e-skateboard modes)
- Commute trips are verified to stop or start within geofences at 30 Caltrain (commuter rail) stations and two Palo Alto job centers. (Innovation 4 - **world’s first** use of geofences for active mode commute verification)
- Incentive dollars are instantly redeemed at local merchants via reloadable Apple/Google Wallet Virtual Visa cards, a new type of payment card. (Innovation 5 - **world’s first** use of reloadable Virtual Visa for commute programs)
- 67% of incentive dollars are spent in Palo Alto, recycling funds back into the local economy to multiply program impact. (Innovation 6 – the highest level of local funds recycling in any commute program - **national leadership**)
- Rapid program growth was achieved by a persuade-to-join-program commute survey (Innovation 7 - **world’s first** use of persuade-to-join program survey for bike incentives) and via labor-intensive door-to-door outreach to 800 small businesses (Innovation 8 - **world’s first** door-to-door marketing outreach for a bike commute program).

Bike Love addresses public transit’s decades-old first mile problem as expressed by our transit operator partner letters:

- “VTA supports active modes and recognizes the importance of bicycles as a way to extend the reach of transit. One of the greatest challenges we face as a transit operator is the low density of our suburban county and long distances to transit stops.” VTA stands for Santa Clara Valley Transportation Authority.
- “Caltrain encourages passengers to use sustainable transportation modes, including bicycling, to get to and from stations.”
- “Commute.org’s strategic plan includes a task to ‘encourage more San Mateo County commuters to use bicycling as an alternative to driving alone for both first/last mile commutes as well as full-length commutes.’” Commute.org provides TDM programs and services to San Mateo County.

There are no other “active first mile to transit” commute incentive programs in the US, but there are two TMAs and eight employers that provide bike-to-work incentives:<sup>3</sup>

---

<sup>2</sup> As far as we know, these are world’s firsts. It is difficult to confirm a world’s first. We both searched the web and queried CUTR’s transp-tdm listserv of 2,000 TDM professionals for counterexamples but found none. We continue to search for counterexamples.

<sup>3</sup> We queried CUTR’s transp-tdm listserv of 2,000 TDM professionals to crowdsource these 10 bike-to-work programs. There may be more.

**Figure 2: U.S. TMA and employer bike-to-work incentives**

TMA	Bike Incentive	Notes
Atlanta's Cash for Commuters	\$5/day, max \$150	
Yolo County T.R.I.P.	\$25/mo, max \$75	
Employer (usually via paychecks)	Bike Incentive	Notes
anonymous major employer	\$5/day	Habitual bicyclists earn more than \$1,200/year
Seattle Children's Hospital	\$3.50/day	Uses Luum commute software
Gates Foundation (Seattle)	\$3/day	Uses Luum commute software
Sony	\$2/day	
Ecology Action (Santa Cruz)	\$2/day	Uses online timesheets by Neon
Oregon Health & Science Univ.	\$1.50/day	Uses Luum commute software
Stanford Univ. Clean Air Cash	\$25/mo	
Tesla	daily incentive	Bike trips verified by Dero ZAP
Google	bike pumps/lights/jackets	Via RideAmigos connected to Strava

**FEATURE SET: FINTECH RELOADABLE VIRTUAL VISA CARDS**

At the project’s commencement, our fintech solution was restricted to merchants using a single point-of-sale (POS) vendor such as Square, requiring negotiation with each local merchant for intrusive API access to the merchant’s entire financial system. Our goal had been to have in-store app-based transactions complete within 60 seconds.

Subsequently, our project researched fintech advances, meeting with Virtual Incentives, Marqeta, Brex, Mastercard, VISA, Apple Pay, Square, Toast, Clover, Blackhawk Networks, and three local merchants (Zareen’s Restaurant, Coupa Cafe, and Palo Alto Bicycles). We discovered and adopted an improved fintech technology from Virtual Incentives, using reloadable Virtual Visa cards that can be added to Apple/Google Wallet, eliminating the need to negotiate with merchants. Our mid-project change to Virtual Incentives made Bike Love more scalable, enabling Apple/Google Pay incentives to all local merchants with a single software addition, compared to the previous requirement of weeks of negotiation to onboard just a single Square merchant. The change made in-store transactions instantaneous.

To enable access to the Virtual Incentives API, Motion completed a Payment Card Industry Data Security Standard (PCI DSS) assessment. (8). (9). PCI DSS is a set of requirements intended to ensure that all companies that process, store, or transmit credit card information maintain a secure environment. PCI DSS consists of 12 requirements encompassing firewalls, passwords, encrypted data storage, encrypted data transmission, anti-virus software, applying security patches, need-to-know data access, physical data security, data access logs, vulnerability tests, and compliance documentation.

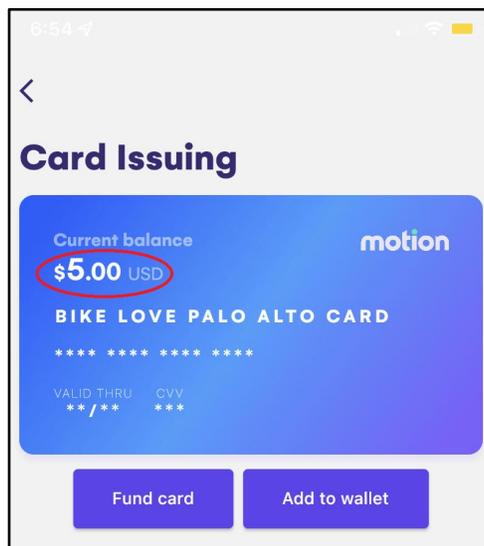
Previously, there were five different types of bank payment cards: debit, credit, gift, prepaid, and virtual. For Bike Love, our Virtual Visa is a new sixth type, combining prepaid and virtual with a unique feature - remotely reloadable by a third party. (10).

Beyond bank payment cards, many limited-transaction transit smart cards enable payment for transit and parking. Within the US, 53 regions provide these cards.<sup>4</sup> As far as digital smart transit cards that work with Apple/Google Pay, cards such as Bay Area Clipper, Chicago Ventra, Portland Hop FastPass, Washington DC SmarTrip, and Los Angeles TAP. These digital cards can be reloaded by a third party (a worker's employer) via employer commuter benefits software platforms. The Bike Love reloadable Virtual Visa has similarities with these cards, but does not limit transactions to transit and parking.

### FEATURE SET: RELIABLE HIGH-STAKES FINTECH TRANSACTIONS

With the previous POS API-based fintech 60-second in-store solution, we had multiple points of failure, including weak connectivity, with the possibility that our virtuous active commuter was out on a date and attempting to pay for a nice Palo Alto dinner with Bike Love. With improved Virtual Visa fintech, commuters can check their balance in advance and then instantly tap and pay with Apple/Google Pay. Figure 3 shows the display when the user checks their account balance.

**Figure 3: The app displays a \$5.00 Virtual Visa balance, instantly redeemable with Apple/Google Pay**



### FEATURE SET: AUTOMATED TRAVEL MODE DETECTION AND COMMUTE TRIP VERIFICATION

#### Travel Mode Detection

<sup>4</sup> [https://en.wikipedia.org/wiki/List\\_of\\_public\\_transport\\_smart\\_cards](https://en.wikipedia.org/wiki/List_of_public_transport_smart_cards)

Statutory constraints in PATMA’s funding from the City of Palo Alto require commute trips to be validated to ensure that the city’s budget is well-spent. In 2019, one of PATMA’s Scoop program subsidy beneficiaries was fraudulently using multiple phones to carpool with herself, eventually resulting in Scoop providing a substantial refund to PATMA. With that in mind, Bike Love implements robust technology to verify commute mode.

Active travel mode detection via mobile phone app had previously been a difficult problem to solve, especially without draining the battery. (11). As of 2022, IOS and Android operating systems APIs provide a series of “travel mode segments” with little battery drain. An example of the subtleties faced: a front pants pocket phone moving up and down with each bike pedal provides a completely different sensor stream than a phone sitting relatively stationary in a bicyclist’s backpack (tends to look like SOV). While it is preferable for Bike Love commuters to put their phone in a front pocket, not every commuter has a pocket sizeable enough to comfortably accommodate a large phone.

The project prefers users to allow their location to be tracked all the time, rather than just within the app. Such permission allows the app to detect false positives (you take a drive but we think it is a bike trip) and false negatives (you bike but we think it is a car trip). Users also have the option to manually start and stop tracking within the application.

For commuters who are understandably concerned about data protection and privacy, we developed reassuring, persuasive messaging:

- “The app is covered by the California Consumer Privacy Act of 2018 and the European Union General Data Protection Regulation (GDPR). We do not share or sell your personal information. We delete your data when you request account deletion. As far as the use of the Virtual Visa card, our full software stack is Payment Card Industry Data Security Standard compliant.” (12).

As of 11/19/2022, without excess battery drain, Bike Love is reliably detecting fast (18 mph) bicyclists carrying phones in backpacks, 13 mph EcoReco e-scooters, and 17 mph GenZe e-bikes in both full throttle and power assist modes.

For bicyclists that might have unreliable Bike Love mode detection with phone-in-backpack, we have discovered \$7 strap-to-your-thigh phone holsters. Such a holster results in the phone’s sensors bouncing up and down with each pedal motion, differentiating the movement from that of SOV. Our project’s Stage 2 experience has been that these holsters are unnecessary.

### **Commute Trip Verification**

The app’s user interface helps commuters build a mental model of both mode detection and commute trip verification. In Figure 4, a valid 1.4-mile bike commute trip from the green circle to the red circle is depicted, taking 12 minutes with the travel mode reported as biking. The green circle is the starting point and the red circle is the destination within the downtown Palo Alto geofence.



## INVESTIGATION (PROJECT STAGE 1): DEVELOPMENT AND VALIDATION OF THE RESEARCH SOFTWARE PLATFORM

From the work scope that we negotiated for the TRB Transit IDEA program grant,<sup>6</sup> the Software Platform Development task, Task #4 is explained below:

We grew our set of research partners to twenty, including the Transportation Research Board, the American Public Transit Association, public transit operators (Caltrain, VTA, LA Metro, Commute.org, Austin Capital Metro Transit), Bay Area Metropolitan Transportation Commission (MTC), Caltrain's secure bike storage vendors (BikeHub, eLock, BikeLink), City of Palo Alto, City of Menlo Park, City of Redwood City, a bike shop (Palo Alto Bicycles), regional planning advocates (Silicon Valley Leadership Group), fintech industry leaders (Virtual Incentives, Marqeta, Sutton Bank), Silicon Valley Bike Coalition, and ALTRANS TMA Inc. Over the course of the project, our partner organizations made these contributions:

- 12 partners provided grant proposal support letters
- 12 attended the Feb 2021 project kickoff meeting
- 9 attended the Nov 2022 project wrap up meeting
- 6 staffed the project's Expert Review Panel, reviewing reports and providing feedback
- 9 tested the app and provided feedback
- As far as fintech, Motion and Virtual Incentives have frequent collaboration and interaction, and then Virtual Incentives handles the fintech relationships with Sutton Bank and Marqeta.

We developed [an 80-second video](#) explaining app installation, program onboarding, adding a Virtual Visa card to the mobile wallet, automated and geofenced trip logging to collect credits, and reward redemption at any Apple/Google Pay point-of-sale terminal.

Thanks to Motion's other pilot program with a corporate partner in Montreal, SSENSE, which onboarded 25 users in July-December 2021; Motion conducted survey and interview research with SSENSE users that produced valuable feedback about the user experience and the interface.

During February-July 2022, 11 app beta test users took 562 active trips covering 606 miles, saving 595 pounds of CO2 and earning \$544 worth of green commute credits. Three earned \$90 or more in credits, four earned between \$32 and \$55, and four earned less than \$13

Our 11 beta testers were the world's first to pay with an Apple/Google Pay Virtual Visa using green incentive dollars provided by a third party. From May-July 2022, we observed 27 Apple/Google Pay transactions by our users for a total expenditure of \$322.99, leaving \$221.38 unspent credits for future use. Five transactions were at grocery stores, and 22 were at coffee shops. The smallest transaction was for \$2.20, and the largest was for \$26.75.

---

<sup>6</sup> [\\$100K TRB-PATMA Bike Love "subaward agreement"](#) - fully executed version

## **CROSS-PLATFORM**

Motion rebuilt its iOS-only app using the Flutter cross-platform software environment, allowing a single codebase to support iOS and Android. In the US, iOS and Android split market share at roughly 50%/50%. Worldwide, Android controls 72% while iOS controls 26%.

## **RELOADABLE VIRTUAL VISA CARDS**

We researched fintech advances, meeting with Virtual Incentives, Marqeta, Brex, Mastercard, Visa, Apple Pay, Square, Toast, Clover, Blackhawk Networks, and three local merchants (Zareen’s Restaurant, Coupa Cafe, and Palo Alto Bicycles). Previously, our fintech solution was restricted to merchants using a single point-of-sale (POS) vendor, requiring negotiation with each local merchant for intrusive API access to the merchant’s financial system. We discovered and adopted an improved fintech technology from Virtual Incentives, using reloadable mobile wallet Virtual Visa cards, eliminating the need to negotiate with merchants. This innovation makes Bike Love more scalable, enabling Apple/Google Pay incentives to all local merchants with the single software addition of a transaction authorization geofence, compared to the previous requirement for weeks of negotiation to onboard a single merchant via POS APIs and permissions.

To enable access to the Virtual Incentives API, Motion completed a Payment Card Industry Data Security Standard (PCI DSS<sup>7</sup>) assessment. PCI DSS is a set of requirements intended to ensure that all companies that process, store, or transmit credit card information maintain a secure environment. PCI DSS consists of 12 requirements encompassing firewalls, passwords, encrypted data storage, encrypted data transmission, anti-virus software, applying security patches, need-to-know data access, physical data security, data access logs, vulnerability tests, and compliance documentation.

## **TRAVEL MODE DETECTION ADVANCEMENT**

Travel mode detection via mobile phone app had previously been a difficult problem to solve. Motion has made steady progress toward increasingly accurate detection. An example of the subtleties that are faced: A front-pants pocket phone moving up and down with each pedal provides a completely different sensor stream than when the phone is relatively stationary in a backpack. Motion’s challenge is made more difficult because of Bike Love’s multimodal focus – such as bike-train-walk trips – and identifying the connecting points between modes.

We persuaded Motion to expose some of the innards of the detection algorithm within the user interface. Even a simple two-mile walk may be detected as a series of walk, run, and “still” preliminary segments that the algorithm can then combine into a single walk segment. The user interface:

- Displays individual travel segments as a series of sub-pages with a start and stop time, mode the algorithm detected, starting address, and stopping address.
- Provides a map of the trip with color-coding for segments of different modes

---

<sup>7</sup> PCI DSS Compliance Guide, <https://digitalguardian.com/blog/what-pci-compliance>

- Allows the user to provide feedback on each attempt to detect mode. Report of false positives (car actual, reported bike) and false negatives (e-scooter actual, reported car). Along with the user feedback, the trip data on the phone is sent to the backend.

This interface makes for a more engaging app, helping commuters build a mental model of the mode detection algorithm.

## SOFTWARE DEVELOPMENT AND BUG REPORTS

We tested 30 software builds, generating 130 bug reports. The breakdown of bug counts and types is shown in Figure 5.

**Figure 5: Buglist breakdown**

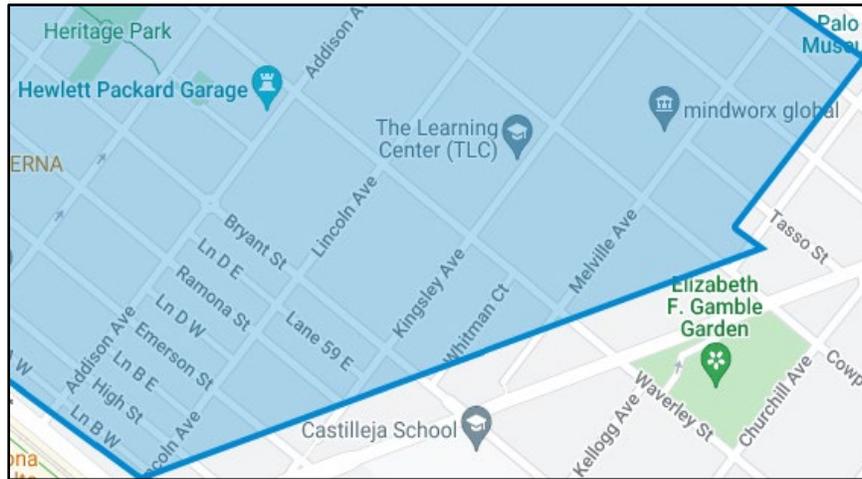
Bug type	# bugs
UI Cleanup	61
Mode detection	22
Trip map display	15
App registration	10
Program enrollment	12
App/backend comms	10
<b>total</b>	<b>130</b>

We also received 87 feature requests during Stage 1. We asked for informal (but detailed) feedback from our commuters. Appendix C provides a rich set of Stage 1 product feedback and features users suggested.

## USER-SUGGESTED FEATURES

Our testing process worked well. A new user-suggested feature was implemented to graphically depict the geofences to provide feedback as to whether an active mode trip is a valid commute or not. For example, Figure 6 illustrates that a 1.6-mile bike trip from 2723 Middlefield Road to Castilleja School at 1310 Bryant Street is just outside of the qualifying geofence, whereas an active trip with a destination at The Learning Center, 459 Kingsley Avenue, qualifies.

**Figure 6: Destinations inside and outside of the rewards program geofence**



Another user’s suggestion was implemented to add the ability to “report” a false positive (car actual, reported bike), false negative (e-scooter actual, reported car), or other problems from the Trip Map screen. Still another user’s suggestion was implemented, coloring Trip Map travel segments as follows: Green for biking, Blue for walking, and Red for driving.

### **SCHEDULE SLIPPAGE**

Because of software slippage from both our fintech software vendor Virtual Incentives and Motion, our project sought and was granted an eight-month project schedule extension.

Our project’s software slippage occurred during a pandemic time period with a high percentage of Work From Home in Silicon Valley that produced lower bike-to-transit commute trips. Stage 2 was advantageously delayed until a noticeable Return to Office was observed, increasing the demand for bike commuting. Had our Stage 1 software been ready earlier, it would have been difficult to launch Stage 2 in August 2021 as was originally scheduled.

As far as the contracted Stage 1 and 2 schedules versus the actual schedule:

- Stage 1 was 14 months late
- Stage 2 was shortened by 4 months

**Figure 6.1: Stage 1 was 14 months late and Stage 2 was pulled in by 4 months**

Contract Stage 1: s/w devt			Contract Stage 2: Launch & Measure		
Start	Stop	Months	Start	Stop	Months
Feb '21	July '21	6	Aug '21	Jan '22	6
Actual Stage 1: s/w devt			Actual Stage 2: Launch & Measure		
Start	Stop	Months	Start	Stop	Weeks
Feb '21	Sep '22	20	9/25/22	11/19/22	8

## INVESTIGATION (PROJECT STAGE 2): CASE STUDY & DECISION SUPPORT TOOL KIT DESIGN

In our June 2020 grant proposal to the TRB Transit IDEA Program, once the software platform was completed, we planned to grow the program over eight months. Due to our previous schedule slippage, our TRB Program Officer asked us to complete the program in eight weeks. We were subsequently able to meet that schedule, operating in production mode from 9/25/2022 to 11/19/2022, covering ISO calendar year weeks<sup>8</sup> numbered 39 through 46:

**Figure 7: Calendar years weeks 39-46**

	Sunday Start	Saturday End
Week 39	Sep 25	Oct 1
Week 40	Oct 2	Oct 8
Week 41	Oct 9	Oct 15
Week 42	Oct 16	Oct 22
Week 43	Oct 23	Oct 29
Week 44	Oct 30	Nov 5
Week 45	Nov 6	Nov 12
Week 46	Nov 13	Nov 19

Our grant proposal envisioned a \$2.50/day incentive for valid bike commutes. Because of our condensed schedule, we raised the incentive to \$5.00/day to accelerate program uptake.

---

<sup>8</sup> ISO weeks: [https://en.m.wikipedia.org/wiki/ISO\\_week\\_date](https://en.m.wikipedia.org/wiki/ISO_week_date)

## INVESTIGATION (TASK 5, STAGE 2): PROGRAM LAUNCH AND ANALYSIS

From the work scope that we negotiated for the TRB Transit IDEA program grant,<sup>9</sup> the Program Launch task, Task #5, is divided into six sub-tasks (5.a through 5.f):

### EVALUATE COMMUTER SATISFACTION

Stage 2 was overwhelmed by commuter onboarding issues. From a research standpoint, our project needs to measure commuter use of the entire Motion feature set. If a commuter never progresses to buying coffee with the Virtual Visa for a valid active trip taken, then we characterize this as an unsatisfactory user experience. Only 33% (36 out of 106) of applicants used the entire feature set. By this measure, we failed to achieve our June 2020 grant proposal's target of 75% commuter satisfaction.

#### *Fat Bear Analogy*

The US National Parks Service's Katmai National Park celebrated Fat Bear Week 10/5/2022-10/11/2022, celebrating the resilience, adaptability, and strength of Katmai's brown bears.<sup>10</sup> A Bike Love program applicant is a salmon swimming up the onboarding river. There are multiple fat bears (onboarding hurdles to surmount like joining the Bike Love Palo Alto program within the motion app, getting a Sutton Bank Virtual Visa issued, adding said Visa to Apple/Google Wallet, turning on permissions to allow always-on location tracking, learning where the geofences are, learning how to earn "coins," redeeming credits onto the Virtual Visa, making a first tap and pay Virtual Visa purchase}. The goal for our salmon is to make it all the way up the onboarding river without being eaten. At the end of week 46, 36 out of 106 had avoided the bears. Beyond Week 46, we expect more salmon to swim further, motivated by the urge to spend the credits they have earned.

**Figure 8: Onboarding is like Fat Bears eating salmon**



Photo credit: L. Law, for National Park Service

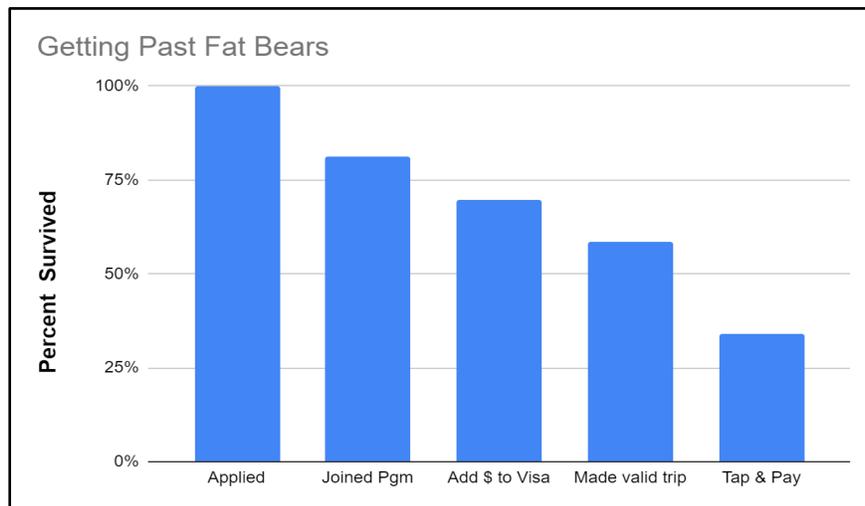
<sup>9</sup> [\\$100K TRB-PATMA Bike Love "subaward agreement"](#) - fully executed version

We conceive seven essential Fat Bears in the onboarding river:

1. PATMA: Fill out the application with a qualifying commute (PATMA outreach via commute survey, word-of-mouth, or Palo Alto Weekly article motivates applications)
2. App Store (download the Motion mobile app)
3. Motion (receive an email invitation that often goes to spam and join the Bike Love Palo Alto program within the app)
4. Sutton Bank & Virtual Incentives (issue the Virtual Visa and add \$ to it)
5. Apple/Google Wallet (add Virtual Visa to wallet, requiring a verification phone call to a Virtual Incentives' 800 number)
6. Trips: Make an active mode trip to a geofence
7. Merchant: Tap & Pay at a local merchant

To track onboarding progress, we instrumented Fat Bears #1, 3, 4, 6, and 7, but did not have as much visibility into #2 and 5 as we would have liked:

**Figure 9: 106 salmon applied, 33% (36) swam all the way to Tap & Pay**



We found the need to invest 30 minutes on each of the 106 applicants to achieve 33% onboarding success. We tracked commuters as they swam up the onboarding river, emailing encouragement and instructions to surmount the next Fat Bear. When warranted, we met the commuter in person to debug issues.

### Why Is Onboarding So Difficult?

Each of our seven bears has its own requirements and Motion represents a negligible part of the business of Sutton Bank, Virtual Incentives, and Apple/Google Pay. Bike Love doesn't generate anywhere enough revenue or profit to rise above low priority with these much larger companies.

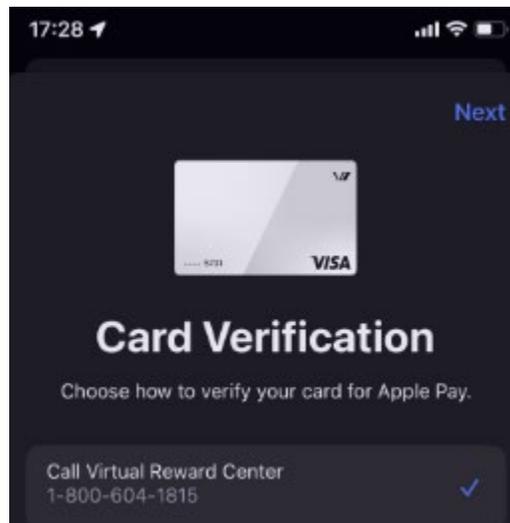
Virtual Incentives (VI) explained that VI's contact center receives more than 100,000 phone/email requests per year (Bike Love generated only 106 VI requests). VI supports 1,050 eGift Card brands, in 52 countries

and 43 currencies. VI has a few additional non-Bike Love mobile wallet verification requests, but the majority of contact requests are for older technologies.

Our app uses the Fat Bears in new ways, creating some unexpected challenges that prevent seamless transitions to the next Fat Bear.

- As just one of many examples, the verification process to add the Virtual Visa to Apple Wallet asks the commuter to call an 800 number, manned by the Virtual Incentives' Virtual Rewards Team. Call centers have high turnover and the Bike Love use case is nowhere near the first training a new recruit should receive. Thus our biker doesn't quite know why she is calling the 800 number and sometimes the Virtual Rewards team provides misleading information like, "you can only use that card at Walmart and Target."

**Figure 10: Apple Wallet card verification directs commuters to call an 800 number**



- Another example of unexpected challenges: Bicyclists are not asked to set up a PIN for their Virtual Visa card, but some grocery store point-of-sale terminals ask for a debit card PIN. Our written onboarding guide instructs bicyclists to just press Enter because there is no PIN. This works, but some bicyclists respond to the prompt by canceling the transaction.

In our attempt to alleviate onboarding issues, we developed a 12-page onboarding guide (provided in Appendix A). Twelve pages is far too long for a mobile app that commuters are expecting to "just work." For example, we negotiated precise language with VI for bicyclists to navigate the 800 number, including instructions to escalate until someone with the "VI Bike Love script" can validate the Virtual Visa addition to the Apple Wallet. We instruct:

- Make the 800 number call and be **very, very sure** to mention that you are verifying "a Virtual Visa card for the Bike Love Program to add to an Apple/Google Wallet." If the Virtual Rewards Center has any confusion, please escalate because all Virtual Rewards Center staff should have received Bike Love instructions.

We can imagine a seamless Bike Love world where Apple owns the entire software stack, provides reloadable virtual Apple payment cards, enhances their iOS travel mode detection, optimizes battery drain from location tracking, and installs the Motion app as part of iOS releases. This imagined world could provide a zero Fat Bear onboarding experience.

In the upcoming Motion Version 2 software release, we believe that a significant amount of onboarding Bears can be eliminated or at least shrunk to a smaller size.

### **Customer Satisfaction Conclusions**

- Motion is not satisfied with the customer's onboarding experience.
- Qualitative feedback from users tends to be very supportive and enthusiastic. We have documented user feedback in Appendices C and D.

### **EVALUATE MERCHANT SATISFACTION**

By our definition, we achieved 100% merchant satisfaction, surpassing our June 2020 grant proposal's target of 75% merchant satisfaction.

Our new fintech solution completely eliminated the issues that we expected would reduce merchant satisfaction with Bike Love. Because of our fintech technology improvement, tapping and paying with the Virtual Visa with Apple/Google Pay worked like any other payment. Therefore we claim 100% merchant satisfaction.

Addressing one sentence in our proposal, there are zero "issues with mismatches between commuter purchasing desires and the availability of applicable merchants."

### **MEASURE THE ACCURACY OF GEOFENCED ACTIVE TRIP DETECTION**

As previously mentioned in Section 4E, User Suggested Features, a Reporting capability was added to the Trip Map, simplifying the reporting of inaccurate mode detection. Not receiving the \$5/day reward for a valid trip that Motion calculated as a false negative turned out to be very motivating. Motion was able to add the proper credits for those reports.

During weeks 39-46, in the core mode detection algorithm, we observed

- From an analysis of 618 valid active commute trips
- 6 false positives (car actual, reported bike)
- 29 false negatives (e-scooter actual, reported car).

Our accuracy calculation is

- Accuracy =  $100\% - (6 + 29)/(618 + 6 + 29) = 95\%$ .

By this accuracy measure, we achieved our June 2020 grant proposal's target of 95% accuracy.

## **EVALUATE THE EFFICACY OF SOCIAL ENGAGEMENT**

We had regular communication with our users, via many different methods including mass email, individual email, SMS, phone, in-person, etc. As reported in Section 4A, we identified three user-suggested features that we implemented, meeting our June 2020 grant proposal's target of three significant software enhancement requests. Appendices C and D provide rich commuter feedback from the Stage 1 Beta software and Stage 2 Program Growth project phases.

## **EVALUATE THE EFFICACY OF PROGRAM LAUNCH AND OUTREACH**

### **Efficacy Results**

Measured against our June 2020 grant proposal:

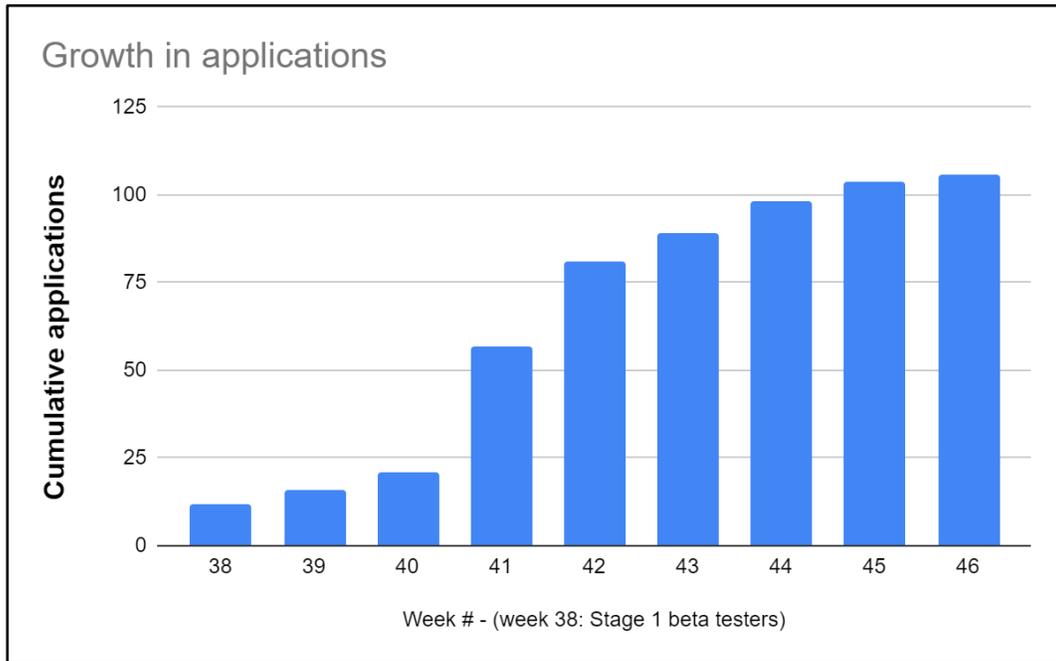
- Our target was to grow the program to 90 participants over eight Stage 2 months. Our Stage 2 launch and outreach produced 106 participants over a condensed eight-week schedule, exceeding the target.
- Our second target was to produce 45 active commuters by Month 8. Our condensed Stage 2 produced only 40 active commuters (see our Section 6a methodology), missing the target.

### **Six Outreach Tasks Were Completed**

1. PATMA's annual commute survey, featuring labor-intensive door-to-door outreach to 800 small businesses, was conducted from 9/1/2022 through 11/11/2022. During this outreach, PATMA staff dropped off persuasive Bike Love postcards at these businesses. The card's call to action is to complete the Bike Love online application. The survey uses persuade-to-join programs survey questions (example provided below), motivating commuters to adopt PATMA programs, including Bike Love.
2. We sent mass emails to the 800 Palo Alto businesses in PATMA's Customer Relationship Management system.
3. We placed a [10/12/2022 article in Palo Alto Online/Weekly](#) and saw a bump in Bike Love applications.
4. We created and distributed our 80-second [Bike Love explainer video](#) to both motivate participation and explain the product. The explainer video was used in multiple places, including PATMA's website and PATMA's Bike Love Application Form.
5. PATMA's website promoted Bike Love.
6. We placed a Bike Love promotion in the Palo Alto Chamber of Commerce's newsletter.

In Week 41, the intensity of the commute survey outreach increased and the Palo Alto Weekly article was published which inspired a segment in a Bay Area local news program that ran multiple times over a few days. All three contributed to a record week of applications:

**Figure 11: Growth in applications, Weeks 39-46. Twelve Stage 1 beta testers joined in Week 38**



### **Door-to-Door Outreach and Commute Survey Instrument Methodology**

Professor BJ Fogg, who founded Stanford’s Behavior Design Lab, inspired PATMA persuade-to-join Annual Commute Survey. Fogg’s principles of “achieving sufficient motivation” apply directly to PATMA’s survey:

- Motivate respondents based on traffic/commute pain.
- In only three sentences, for each PATMA commute program, persuade respondents of the benefits of the program.
- Simplify the survey to reduce time to complete.
- Reward respondents for completing the survey with a raffle. (14).

In 2019, PATMA converted from a third-party traditional annual commute survey to an in-house persuade-to-join program survey, generating program growth of:

- 31% for the Waze carpool program
- 38% for the transit pass program
- 70% for the after-hours Lyft program.

To increase the response rate, PATMA staff laboriously undertook block-by-block, door-to-door canvassing resulting in a dataset of 800 downtown businesses that was provided to the City to help update the City’s Business Registry. The canvassing:

- tripled the response rate from 486 to 1,471 responses,
- quadrupled the number of participating employers from 44 to 156,
- reduced the survey cost by 40% from \$38,500 to \$22,500.

The previous third-party one-size-fits-all survey instrument created confusion as some employers have well-developed in-house TDM programs, and only some employees qualify for the TMA’s low-income programs. In response, the TMA added survey branching to segment employees and also created custom surveys to meet the needs of different employers. The TMA went so far as to create employer-specific surveys for the City, Palantir, and Amazon A9 that combine employer program questions with TMA program questions. Within those three custom surveys, respondents were motivated to contact their employer or the TMA about specific programs. Further, the TMA enabled Palantir and A9 to bring the survey behind their firewalls so that they could meet their data protection/privacy requirements while still providing the same survey data to the TMA as other employers. (15).

The PATMA 2022 Annual Commute Survey persuade-to-join BikeLove question is provided in the box below. Results are measured by program sign-up.

QUESTION TITLE: \$600 REWARD WHEN YOU BIKE TO WORK OR CALTRAIN

PATMA’s “Bike Love” pilot, the world’s first Apple/Android mobile app, pays you \$5 per day, up to \$600 per year, to bike to jobs in Downtown or the Cal Ave area. We also reward biking and parking at Caltrain stations on the way to your Palo Alto job. Instantly redeem rewards at local merchants via your Apple/Google Pay Bike Love Virtual Visa card. The app tracks your location to confirm valid bike, e-bike, e-scooter, and e-skateboard trips (we comply with the California Consumer Privacy Act of 2018). Check out our one-minute [explainer video](#).

Sign up for the program here - [Bike Love Application Form](#). (See Appendix B below)

How well does this bike commute solution fit your needs?

- A great deal
- A lot
- A moderate amount
- A little
- None at all

As previously mentioned, the door-to-door outreach included dropping off Bike Love postcards:

**Figure 12: PATMA commute survey team member Ellen Wilkinson distributing the commute survey and Bike Love postcards at Cafe Venetia**



**Figure 13: Persuasive Bike Love postcard includes a QR code call to action**

**palo alto TMA**

## \$5/day to bike to work

*leave your car at home, get exercise, and save \$\$ on gas*

PATMA's new "Bike Love" mobile smartphone app for Apple/Android pays you \$5 per day, up to \$600 per year, to bike to your job in Downtown Palo Alto or the California Ave area if you are not already biking to work.

Interested? Sign up for the program through your smartphone camera with this QR code. Thank you!



Questions? [justine@paloalgotma.org](mailto:justine@paloalgotma.org)

### **Word of Mouth Spread of Bike Love**

We observed a word-of-mouth program growth effect from the following eight employers. Where possible, we guided new applicants to learn from the employee that had progressed the farthest in onboarding.

**Figure 14: Evidence of word-of-mouth program growth at eight employers**

<b>Employer</b>	<b># participants</b>
Avenidas	4
Cape Analytics (tech)	4
City of Palo Alto	5
Ettan Restaurant	10
Fizz Social (tech)	4
Ladder Life (tech)	6
PA Bikes	6
Patagonia	5

**MEASURE MERCHANT PARTICIPATION GROWTH**

Our new fintech solution eliminated the bulk of Task #5.e that our grant proposal anticipated whereby we would:

- laboriously engage with individual merchants and
- persuade them to collaborate with us on the use of a Square or Toast point-of-sale API

In this section, we have answered the work scope questions:

- provide tabular reward redemption results sorted by merchant type
- measure the number of participating merchants against the grant proposal’s target of 20 merchants (90 merchants accepted Bike Love Virtual Payment in Stage 2)

During weeks 39-46, there were:

- 158 Virtual Visa transactions
- at 90 different merchants
- worth a total of \$2,355
- with an average transaction amount of \$14.90.

Sixty-seven percent of the incentive-funded transactions were either:

- spent at Palo Alto merchants, recycling funds back into the local economy or
- spent on transportation to/from Palo Alto (such as Caltrain or Clipper), serving PATMA’s mission.

The remaining 33% of transactions were spent outside of Palo Alto. Our product information told commuters that the Virtual Visa would only work in Palo Alto, but some commuters figured out that they could use the Visa outside of Palo Alto.

**Figure 15: Breakdown of Palo Alto and Non-Palo Alto Virtual Visa transactions**

	Coffee	Grocery	Restaurant	Retail	Transport	Online	Sum	Percent
Palo Alto	\$515	\$501	\$322	\$207	\$84		\$1,628	67.3%
Non- Palo Alto	\$78	\$19	\$114	\$333		\$247	\$792	32.7%

**Figure 16: Breakdown of merchants that received Virtual Visa payments**

	Coffee	Grocery	Restaurant	Retail	Transport	Online
Palo Alto	Ada's, Backyard, Venetia, Coupa, M. Colette, Manresa, Sun Tea, PA Cafe, Peet's, Philz, Starbucks, Tong Sui, Verve, Zombie	Country Sun, Farmer's Mkt, Grocery Outlet, M. Stones, Piazza's, Real Produce, Safeway, TJ, WFM	Gott's, Lulu's, McD's, Mendo Farms, Poke Hse, Zadna, Zareen's	CVS, Fillmore & 5th, Mac's, Papersource, Summit Bikes, USPS	Clipper Caltrain Lyft	
Non- Palo Alto	Equator, Little Sky, Saint Frank, Midwife & Baker, Tisane	Cherry Liquors Apna Bazar	Cadillac Bar, Denny's, Nick the Greek, La Corneta, Senor Tacos, DNA Pizza, Axe & Palm	IKEA, Target, Century & Icon Theaters, Ross, Lyca Mobile, Dry Rub Repub, M S Bicycles		Depop, Amazon, eBay, mcafee, Mint Mobile

When a commuter makes a Virtual Visa purchase, the transaction is logged with the date, amount, and the merchant's ID. Some retail chains have store-specific merchant IDs, others do not. For a future Motion Version 2.0 software release, a Motion customer such as PATMA may create a list of approved Palo Alto-only merchant IDs where other transaction attempts for unapproved merchant IDs are rejected. This can ensure that 100% of funds are recycled back into Palo Alto's economy. But this step of rejecting transactions should not be taken lightly, as transaction rejections are stress-inducing.

**SOFTWARE STATUS INCLUDING BUG REPORTS**

We conclude there is a need for a March 2023 Motion version 2.0

- Below we have prioritized the main new features from both our bug database and our enhancement request database.
- We have also identified some future research needs that version 2.0 software can support

The new features for March 2023 Motion version 2.0 are as follows:

**Onboarding**

Of our seven Fat Bears, we will strive to eliminate four and improve three:

1. Eliminate: PATMA needing to manage applications and asking qualifying questions.
2. Improve: make the Motion app easier to find on the Apple and Google App Stores
3. Eliminate: a step by allowing commuters to choose to join Bike Love within the app preferably on the first use. The app can also provide nudge notifications to join Bike Love Palo Alto (the app can algorithmically detect when valid Bike Love Palo Alto commutes are occurring).

4. Eliminate: Sutton Bank and Virtual Incentives (issue the Virtual Visa and add \$ to it) - Motion software automatically to issue the Virtual Visa and redeem the initial \$10 joining credit to the Virtual Visa
5. ELIMINATE: Apple/Google Wallet (add to wallet, verify via an 800 number) - Motion software to add Virtual Visa to Apple Wallet, verify immediately without the 800 number phone call, and provide notification as soon as the commuter can Tap and Pay the first coffee purchase - strive to make this instantaneous. In our ideal outcome, the commuter buys coffee with the Virtual Visa within 5 minutes of downloading the app.
6. IMPROVE: Trips: Make an active mode trip to a geofence - provide nudge notifications and training notifications to encourage trip-making
7. IMPROVE: Merchant: Tap and Pay at a local merchant - a) find a fintech partner that can eliminate grocery stores from requesting a Virtual Visa PIN #. b) provide nudge notifications to encourage commuters to buy their first coffee.

## User Experience

Introduce in-app notifications to guide user behavior

- Notify the commuter about success navigating onboarding tasks. When a commuter comes back to the app after being away for an hour, notify to take the next onboarding step.
- On the first few app uses, notify the commuter about each trip taken while guiding the user to reveal the Trip Map.
- Upon successful addition of the Virtual Visa to the user's Apple/Google Wallet (this can take 24 hours), the app messages the user about this and tells the user to go buy coffee using Virtual Visa tap and pay.
- Encourage users to use the "hidden features" like swiping right to reveal the previous day's activities & exploring Trip Maps.
- Nudge users to learn about earning coins and geofences. Help build the user's mental model of how the app works. Explicitly state the rules of the commute program.
- On a reasonable, not irritating, tempo, nudge commuters:
  - to redeem credits to the Virtual visa ("You have \$30 in unredeemed credits.")
  - to Tap and Pay with their Virtual Visa. ("You have \$40.25 on your Virtual Visa, please consider making a Tap and Pay purchase.")

For previously hard-to-discover app features,

- provide visual clues to indicate that swiping is a possible gesture to show more information.

## Trip Data

Further instrument for research and product knowledge.

- Within trip distance data, provide total distance and distances for each mode.
- Within the administrative dashboard, provide the ability to view Trip Maps.

Support "Car vs. Bike Speed" research and analysis

- Within a valid trip there can be multiple segments for different modes. For the bike segments, calculate the average speed for all the bike segments. per trip. For comparison, calculate the car segment average speed (including waiting at stop lights).

## **Data Sets and Charts That Are Made Available Through the Administrative Dashboard**

In hopes of quickly providing visual snapshots of different program aspects,

- Automate the production of some of the charts generated for the Final Report.

## **Data Privacy and Protection**

Some commuters feel the app's auto-tracking is too privacy-invasive.

- For privacy-protecting home and possibly workplace, the user could set a random "hidden" radius (like the Strava app). It also might be a good idea to have a user setting to: a) discard any trips that are entirely by car (wouldn't qualify for the reward) or b) that don't enter the geofenced area.

## **Virtual Visa Payment Card**

Locate a fintech vendor that allows Bike Love to limit transaction authorization to only work for Palo Alto merchants and a few other types of purchases (Caltrain tickets, Caltrain bike storage, etc).

## INVESTIGATION: (TASK 6, STAGE 2) PROGRAM GROWTH AND MEASUREMENT

From the work scope that we negotiated for the TRB Transit IDEA program grant,<sup>11</sup> the Program Growth and Measurement task, Task #6, is divided into seven sub-tasks (6.a through 6.g). Additional work performed beyond the work scope is covered in sections 6.h and 6.i.

### MEASURE RETENTION OF PROGRAM PARTICIPANTS

Figure 17: For 66 Active Bicyclists Identified as 1-66, Week 39-46 Activity Is Shown, with Dark Green for Seven Active Days and Lightest Green for One Active Day

ID	39	40	41	42	43	44	45	46
1				6	7	6	3	4
2			1					
3								4
4				5	4	4	3	
5				7	7	7	1	5
6						3		
7				3		2	4	2
8					3	7	2	
9		2			2			
10						4		
11			1	5	7	4	1	
12	7	5	3	6	5	6	6	5
13		5	7	5	5	7	6	5
14		5		3	5	1	2	
15					4	2	4	5
16						5	4	2
17			5	7	7	5	5	1
18					6	2		
19	5	4	6	4	5	4	5	
20			1	6	6	4	4	5
21						1		
22							2	
23								1
24					6	3	2	3
25			1					
26				3				
27	1	4	7	6	7	3	4	4
28							1	3
29							1	
30							1	
31			4	7	7	5	6	4
32			5	7	7	7	7	5
33	5	7	7	4		5	2	
34				7	4			
35				7	6	7	7	5
36						2	5	5
37							1	2
38			1	1	2			
39			5	6	7	2		
40			1	2	1	2		
41	3			6	5	2		
42							1	
43			1	2	1			
44					3	7	6	5
45	1		2					
46	5	6	7	5	3	5	5	2
47							2	2
48							1	2
49			1	1	1			
50							3	1
51				3	5	4	3	3
52						5	4	2
53				4	5	4	4	2
54			1	2	2	2	4	2
55				3	5	3		
56				4	4	4	2	3
57	6					4		
58				4	2			
59				2	2	2	2	2
60						2		
61	3	3	5	3	2	1		
62				5	2	3		
63	5	4	5	5	1			
64			5	7	6	4		
65		2	2	7	4	1		
66			1	2	4	1		

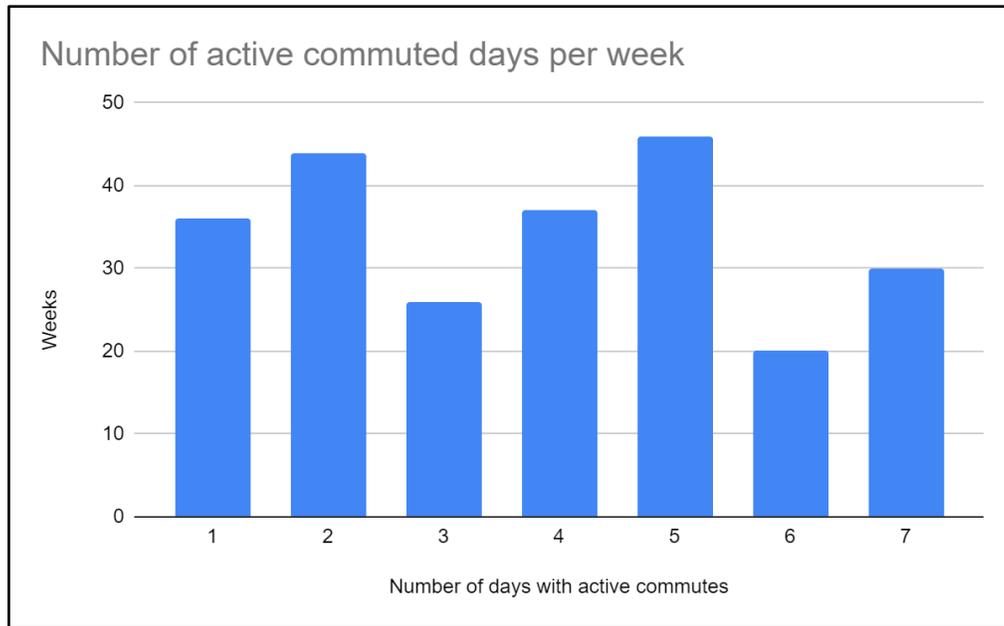
<sup>11</sup> [\\$100K TRB-PATMA Bike Love “subaward agreement”](#) - fully executed version

We had 106 participants in the program (those who submitted a Bike Love application to PATMA). Of those, 66 had 1 or more active weeks. There are many measures of retaining commuters in our program. Our admittedly imperfect measure chosen is “those commuters active in weeks 45-46 are retained.” By this measure, 40 out of 66, or 60%, are retained. This is higher than our June 2020 grant proposal’s hypothesis of 50% retention.

**MEASURE THE FREQUENCY OF ACTIVE COMMUTES AMONG PARTICIPANTS**

In our eight-week program, our commuters had 910 days with active commutes. Within this group of commuters, there were a total of 239 weeks with 1 or more active commutes, yielding an average of 3.8 active commutes per active week:

**Figure 18: Number of active commute days per week**



This level of activity was much higher than our June 2020 grant proposal’s hypothesis of only 2.9 active commutes per week without any six or seven-day active weeks. We believe that the small sample combined with running the program before the post-COVID “new normal” is not an accurate indicator of the level of activity Bike Love will yield once the new normal occurs. By “new normal,” we mean when offices open back up fully to where 100% of employees are allowed to come back to the office.

**QUANTIFY SOV COMMUTE REDUCTION COST-EFFICACY**

For Stage 2, our cost per reducing one year of SOV commuting equals

- 240 commute days per year
- times \$5/day

for a \$1,200 per year cost, an overshoot of our proposal target of \$900/year.

In our original grant proposal concept, we envisioned front-loading incentives and then lowering the daily incentive towards the end of the year. We are constrained by a need to keep the total Bike Love incentive for one commuter to just under \$600, to avoid the requirement to collect commuter Social Security numbers and complete IRS Form 1099 - Miscellaneous Income for each user.

Moving from a \$10 credit for first using the app and front-loading \$5/day incentives, we can envision the following rewards through a Bike Love commuting year of 240 work days for a bike-everyday commuter:

**Figure 19: An example credits rule for \$600/year max and 240 commute days/year**

Item	Days	Total
Join the Bike Love Program credit	First day	\$10
\$5/day incentive	First 60 days	\$300
\$2/day incentive	Second 145 days	\$290
No incentive	Last 35 days	\$0
totals	240	\$600

**QUANTIFY ANY CANNIBALIZATION OF TRAIN COMMUTES BY BIKING**

Of Stage 2’s 640 valid commute days

- 601 were direct bike-to-work (93.9%)
- And 39 were bike-to-Caltrain and then take Caltrain to work (6.1%)

The 39 bike-to-Caltrain trips were split among 8 stations, with San Carlos having the highest number of 11 bike trips:

**Figure 20: Caltrain stations frequented by bike-to-Caltrain commuters**

Station	Count
Millbrae	1
Belmont	2
San Mateo	2
San Francisco	4
Diridon	5
Mtn View	6
Hayward Park	8
San Carlos	11

We were not able to survey participants to identify any short-distance (0 to 10 miles) Caltrain commutes that were cannibalized by direct bike-to-work commuting.

## **MEASURE THE LEVEL OF REDEMPTION OF AVAILABLE REWARDS DOLLARS**

Our grant proposal hypothesized that the average Bike Love participant would be carrying around a Virtual Visa with an average of \$20 available to Tap and Pay. In actuality, the average Virtual Visa card balance is \$9.20.

Commuters earn credits of

- \$10 for joining the Bike Love program within the Motion app
- \$5/day per valid commute

creating a balance sheet liability for Motion. In weeks 39-46, 86 commuters joined the Bike Love program, for a total of \$860 in joining credits. There were 640 valid active commute trips taken, for a total of \$3,200 credits. Total credits are \$4,060.

Commuters can redeem credits with their Virtual Visa. Once a dollar amount is associated with a particular Virtual Visa, then transactions can be authorized from our fintech partner Sutton Bank. Our 86 commuters that earned some amount of credits redeemed 77% of available credits (\$3,146) to their payment cards.

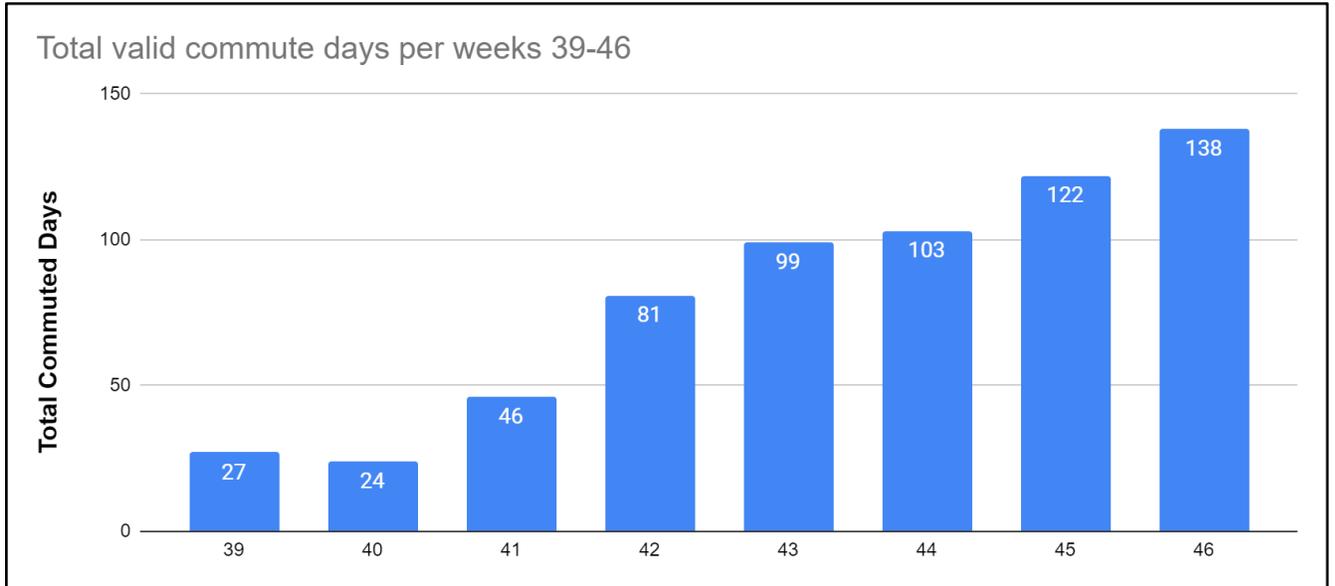
Tap and Pay Virtual Visa transactions are made to merchants. We had \$2,355 worth of those transactions, 58% of the available credits, leaving a \$791 unspent balance on 86 Virtual Visa cards for an average of \$9.20 per card.

## **MEASURE COMMUTER PARTICIPATION GROWTH**

In our June 2020 grant proposal, our target was to grow program membership to 90 over eight months. Within our shortened eight-week time frame, 62 commuters made valid trips (out of 106 applicants), demonstrating faster-than-expected growth.

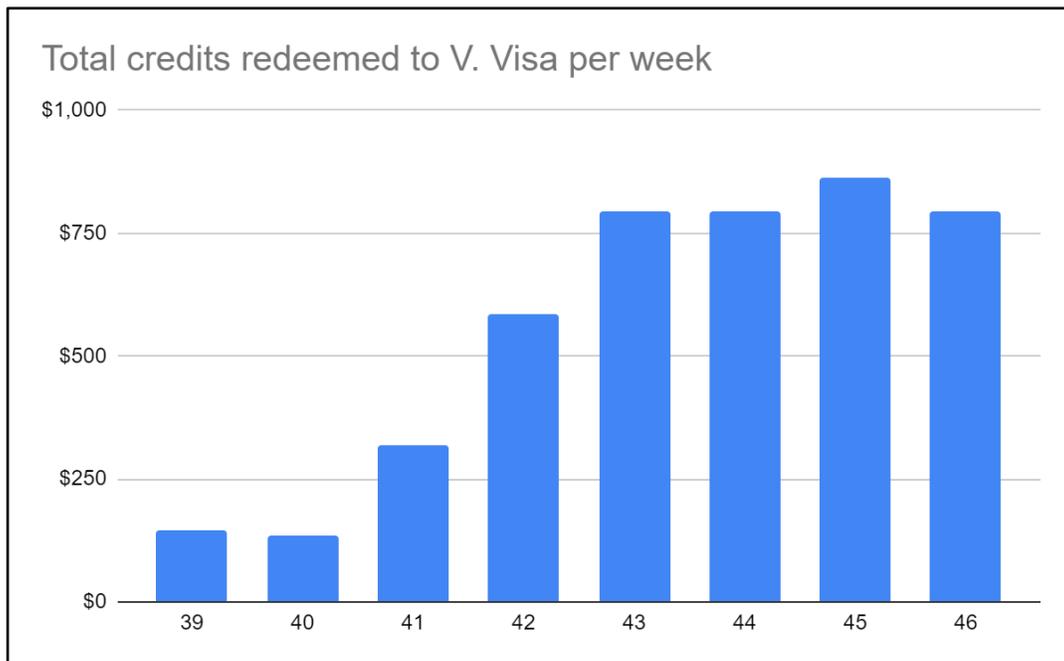
The number of valid commute days per week grew nicely during Weeks 39-46. We expected a leveling off of valid days for Weeks 45-46, because the end of Daylight Savings occurred in Week 45 making active mode commutes less pleasant.

**Figure 21: Total valid commute days per weeks 39-46**



We saw commuters take the \$5/day rewards they earned for valid commute days and then redeem those credits to their Virtual Visa. The growth in credits redeemed per week was sharp in Weeks 40-43 and then leveled off:

**Figure 22: Total credits redeemed to Virtual Visa per week**



**SOFTWARE STATUS INCLUDING BUG REPORTS**

This redundant work scope item was provided above in Section 5f.

### ADDITIONAL WORK PERFORMED: EQUITY ANALYSIS

PATMA divides employers into four types: government, office (dentists, accountants, financial services), service (restaurants and retail), and technology. We assume that service workers have lower incomes and are most in need of commute subsidies. From the 102 program participants we were able to categorize by employer type, 37.3% of employees came from service jobs.

**Figure 23: 37% of Bike Love participants work in service jobs**

employer type	count	percent
government	6	5.9%
office	33	32.4%
service	38	37.3%
technology	25	24.5%

One Palo Alto service worker needed a bike to start Bike Love participation. PATMA collaborated with Bike Exchange to provide the worker with a refurbished bike:

**Figure 24: Happy commuter takes delivery of his PATMA/Bike Exchange refurbished bike**



### ADDITIONAL WORK PERFORMED: VMT AND GHG SAVINGS

Total vehicle miles traveled (VMT) and greenhouse gas (GHG) savings for Weeks 39-46:

- 2,649 VMT reduced

- 2,601 pounds CO2 avoided

## PLANS FOR IMPLEMENTATION AND SCALING

### PRODUCT PAYOFF POTENTIAL

PATMA is committed to Bike Love and the City of Palo Alto has provided PATMA with annual funding for commuter subsidies each year since 2016. PATMA's GIS analysis supports the potential for Bike Love to scale. Eighty percent of PATMA's target commuters live within three miles of Caltrain, VTA light rail + Caltrain, El Camino Real buses, or the Dumbarton Express bus. This analysis indicates the tremendous potential for mode shift to transit.

In Stage 2, we discovered untapped Bike Love demand within Palo Alto:

- Residents are interested in active commute subsidies to jobs outside of Palo Alto. PATMA may be able to obtain permission to serve these commuters in the future.
- Three large employers outside of our Cal Ave and University Ave geofences stepped forward to express interest.
- The recent passage of a city business tax holds the potential to improve PATMA's finances, allowing the expansion of Bike Love.
- Still impacted by COVID, large tech employers currently have small in-office staffing levels that should increase in 2023.

Workers commuting to adjacent cities also revealed interest in Bike Love.

T-99 Expert Review Panel member Caltrain has undertaken an ambitious program to increase bicycle first-mile to Caltrain, by installing more than 330 electronic bicycle lockers at 22 stations. Caltrain has funding for hundreds of additional e-lockers. This effort gives commuters a secure place to park their bike, increasing Bike Love's chances of success.

Recent local infrastructure improvements support increased bike adoption: the Peninsula Bikeway, 12 slow streets, and new Highway 101 bike bridges in East Palo Alto<sup>13</sup> and Palo Alto.<sup>14</sup>

### PRODUCT TRANSFER

Motion's platform is built to scale to other locations, and Motion can also customize its product to individual employers. We expect to see first-mile and active mode incentives expand beyond the relatively small set of U.S. incentives providers: {Atlanta's Cash for Commuters, Yolo County T.R.I.P., Seattle Children's Hospital, Gates Foundation, Sony, Ecology Action, Oregon Health & Science University, Stanford University Clean Air Cash, Tesla Motors, and Google}. We also expect that one additional software vendor {GetMiles, RideAmigos with Strava, DeroZap, AgileMile, Velocia, etc.} will adopt Virtual Visa (prepaid/virtual/3rd-party-reloadable) fintech commute rewards by the end of 2023.

Our project partners have expressed interest in scaling Bike Love, such as:

---

<sup>12</sup> <https://beta.menlopark.org/News-articles/Transportation-news/20220124-Menlo-Park-joins-neighbors-in-supporting-the-Peninsula-Bikeway>

<sup>13</sup> <https://www.paloaltoonline.com/news/2019/05/19/east-palo-alto-celebrates-grand-opening-of-us-highway-101-overpass>

<sup>14</sup> <https://www.cityofpaloalto.org/Events-Directory/Public-Works/Highway-101-PedestrianBicycle-Bridge-Opening>

- The Valley Transportation Authority is analyzing Bike Love to “see if it can be replicated in other locations.”
- The City of Menlo Park will analyze the “potential to scale Bike Love.”

We are spreading the word about the Bike Love project in various ways, in hopes of transferring Bike Love or parts of the concept to other locations. We will:

- publish a Bike Love paper in Transportation Research Record,
- present a Bike Love poster at TRB 2023,
- introduce the project to CUTR’s transp-tdm listserv,
- make a LinkedIn post about Bike Love, and
- encourage our project partners to introduce the concept among their networks.

The Metropolitan Transportation Commission’s Plan Bay Area 205015 states “When it comes to achieving (commute) mode shift (away from SOV to achieve GHG reduction targets), strategies that prioritized active transportation saw the most pronounced shifts in the regional model (compared to transit and ridesharing). Given the low cost relative to other investments studied, the benefit-cost ratio is greater than one, and the equity scores suggested that lower-income individuals received a larger share of accessibility benefits than higher-income individuals.”

---

<sup>15</sup> <https://www.planbayarea.org/>

## CONCLUSIONS AND LESSONS LEARNED

### LESSONS LEARNED

#### Privacy and Data Infringement

From the project's kickoff workshop, some on the Expert Review Panel expressed concern that commuters' discomfort with privacy and data infringement due to geo-tracking would hinder adoption. Experience with the project proves this to be the case.

The sentiment was expressed by one commuter:

“Regarding using the auto-tracking mode. Anyone who has access to the data could easily find where I live and work, and anywhere I've been, even if the trip is by car. For privacy-protecting home and possibly workplace, a random 'hidden' radius could be set by the user (like the Strava app). It also might be a good idea to automatically (or have an option to) discard any trips that are entirely by car (wouldn't qualify for the reward) or that don't enter the geofenced area.”

We plan for a future version of the app to support this 'hidden radius' feature.

#### Fintech

When Motion first reached out to Marqeta, a large fintech company, they asked if Motion would generate at least \$10 million per month of transaction volume. Motion anticipates only a small fraction of that volume. We have learned that fintech companies prioritize their large-volume customers over Motion. This resulted in schedule slippage and other challenges.

While we found that it was the right choice to move away from the Point of Sale APIs that we had planned to exploit, we also found that implementing Virtual Visa went slower than we would have liked and we were not able to motivate Virtual Incentives to expedite their schedule.

As the industry plays out, we expect that more vendors will provide Virtual Visa capabilities and compete over smaller volume applications. The availability of the Apple credit card is intriguing because integration will presumably be easier for Motion Bike Love.

#### Onboarding

We found that the process of onboarding takes far too many steps. The barriers are numerous but surmountable. We documented the multiple-step onboarding process for our users and this document can be found below as Appendix A.

Along with feature enhancements in Motion Version 2.0 software, further advances in the fintech space will also contribute to easier onboarding.

## **A New Motion Version 2.0 Is Needed**

A Version 2.0 feature list is provided in Section 5f above.

## **CONCLUSIONS**

In condensing our planned eight-month Stage 2 down to eight weeks, we were still able to meet or exceed two-thirds of our project targets for:

- completing our long list of outreach tasks
- outreach efficacy
- applications generated
- active users
- mode detection accuracy

but commuter onboarding problems overwhelmed the project, resulting in a low level of commuter satisfaction. Through Stage 2, we learned how to better apply this technology going forward.

We proved the potential for the platform to generate exceptional data, metrics, and at-a-glance program snapshot graphics.

In Section 3A, we provide the arguments behind why we claim to have implemented eight original innovations and we look forward to being challenged on our claims.

## **An Eight-Month March-October 2023 Research Program Should Be Pursued**

- The Version 2.0 Motion feature set will provide better research results. Onboarding success should double from 33% for Weeks 39-46 to 66% in 2023. October 2023 commuter satisfaction survey research should be undertaken and 75% satisfaction should be achieved. Customer satisfaction with the “program snapshot dashboard” should be obtained.
- There is a need to undertake a Bike Love research program under post-COVID “new normal” commute conditions to obtain data that isn’t obscured by many Silicon Valley workers still working from home.
- There is a need to collect eight sunny months of data, beyond this program’s eight weeks of data.
- Compared to our Stage 2, ten times more trip data should be collected and analyzed.
- The response to daily commute incentives that start high and end lower should be obtained.
- A higher than \$10 credit for joining the Bike Love program should be contemplated. Although we expect Version 2.0 to dramatically improve onboarding, our Stage 2 pain of expending 30 minutes per commuter in customer support suggests that the more motivation we can provide to get past the onboarding hurdles, the better the program experience for both staff and commuters.

## **Bike Love Data and Charts Are Compelling**

The data and charts provide powerful trends analysis and actionable software product manager insights.

## **The \$5/day Incentive Provided Substantial Motivation**

The weekly purchasing power of the Stage 2 \$5/day incentive was more than doubly motivating compared to the \$2.50/day incentive used during Stage 1. Commuter survey research should be undertaken on this phenomenon, but it appears that \$2.50 doesn't buy much anymore.

### **Weeks Not Months**

Bike Love commute data and “program snapshot dashboards” should be created in weekly units rather than in the monthly chunks that the grant proposal had envisioned. The natural rhythm of commuting is in weeks.

### **Our Partners Want Emerging Mobility Projects Like Bike Love to Continue to Grow and Evolve**

All of our partners have a helpful attitude towards Bike Love and are rooting for the project.

## IDEA PRODUCT

Software partner Motion has developed a mobile app commuter platform called Motion, helping organizations shift commute behavior towards green, active, and micro-mobility modes. Motion simplifies the design and implementation of commuter programs with direct incentives to the employer staff for 'green' commuting. Bike Love is one of multiple commute incentive programs on the platform, which serves North American and European programs.

Using the Motion platform, Palo Alto TMA implemented the “Bike Love” commuter program to provide daily incentives for verifiable active mode first-mile commute trips to transit and active mode commutes from home to work, up to \$600 per year per commuter. Automated travel mode detection identifies bike, e-bike, e-scooter, and e-skateboard trips. Commute trips are verified to stop or start within geofences at 30 Caltrain (commuter rail) stations and two Palo Alto job centers. Incentive dollars are instantly redeemed at local merchants via reloadable Apple/Google Wallet Virtual Visa cards, a new type of payment card. 67% of incentive dollars are spent in Palo Alto, recycling funds back into the local economy.

The platform provides exceptional data, metrics, and at-a-glance program snapshots, providing powerful trend analyses and actionable insights for Commute Program Managers and Motion’s Software Product Managers.

From our assessment, once onboarding issues are addressed, we believe that Bike Love and portions of the technology are ready to spread. We expect:

- Another transportation incentive program will implement reloadable Virtual Visas.
- Another TDM program will adopt PATMA's door-to-door persuade-to-join commute survey.
- Bike Love will spread to additional cities.

## REFERENCES

1. Steve Raney, Sana Ahmed, Kruti Ladani. *Social Equity and Accessibility: Low-income Transit Pass Program*. FTA Mobility on Demand Sandbox - Fair Value Commuting Project, 10/7/2019. [www.bit.ly/FVCEquitySummary](http://www.bit.ly/FVCEquitySummary).
2. Steve Raney. *PATMA Calendar Year 2019 Annual Report*. [www.bit.ly/PATMA2019report](http://www.bit.ly/PATMA2019report)
3. Caltrain. *Caltrain Launches Go Pass Donation Program*. 09/13/2021. [www.caltrain.com/news/caltrain-launches-go-pass-donation-program](http://www.caltrain.com/news/caltrain-launches-go-pass-donation-program)
4. Atlanta Regional Commission. *TDM Virtual Incentives Reward Platform RFP*. 4/13/2020. [cdn.atlantaregional.org/wp-content/uploads/gco-incentives-rewards-program-final-rfp.pdf](http://cdn.atlantaregional.org/wp-content/uploads/gco-incentives-rewards-program-final-rfp.pdf). Virtual Incentives has won two ARC RFPs, with program details described in the PDF.
5. Steve Raney, Sana Ahmed, Kruti Ladani. *Social Equity and Accessibility: Low-income Transit Pass Program*. FTA Mobility on Demand Sandbox - Fair Value Commuting Project, 10/7/2019. [www.bit.ly/FVCEquitySummary](http://www.bit.ly/FVCEquitySummary).
6. City of Palo Alto. *2012 Bicycle + Pedestrian Transportation Plan*. 2012. [www.cityofpaloalto.org/files/assets/public/transportation/projects/bicycle-pedestrian-transportation-plan\\_adopted-july-2012.pdf](http://www.cityofpaloalto.org/files/assets/public/transportation/projects/bicycle-pedestrian-transportation-plan_adopted-july-2012.pdf)
7. SPUR. *Webinar: How Can We Encourage the Mass Adoption of Walking and Biking?* 11/10/2020. [www.spur.org/events/2020-11-10/how-can-we-encourage-mass-adoption-walking-and-biking](http://www.spur.org/events/2020-11-10/how-can-we-encourage-mass-adoption-walking-and-biking). The kickoff meeting discussion and poll were informed by SPUR's webinar.
- 8.. Juliana de Groot. *What is PCI Compliance?* 8/12/2021. [digitalguardian.com/blog/what-pci-compliance](http://digitalguardian.com/blog/what-pci-compliance).
9. PCI Compliance Guide, *PCI Compliance Guide*. Undated. [www.pcicomplianceguide.org/faq/](http://www.pcicomplianceguide.org/faq/)
10. Fin.do. *What types of bank cards exist?* 2/18/2022. [www.fin.do/blog/79\\_what-types-of-bank-cards-exist](http://www.fin.do/blog/79_what-types-of-bank-cards-exist)
11. Muhammad Awais Shafique and Eiji Hato. *Travel Mode Detection with Varying Smartphone Data Collection Frequencies*. Sensors (Basel). 5/2016. [www.ncbi.nlm.nih.gov/pmc/articles/PMC4883407/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4883407/)
12. Jose Diaz. *Motion's Privacy Policy*. 12/14/2021. [himotion.co/privacy-policy](http://himotion.co/privacy-policy). We provide both summary messaging and our 18-page (human-readable) privacy policy document.
13. Steve Raney, Sana Ahmed, Kruti Ladani. *Social Equity and Accessibility: Low-income Transit Pass Program*. FTA Mobility on Demand Sandbox - Fair Value Commuting Project, 10/7/2019. [www.bit.ly/FVCEquitySummary](http://www.bit.ly/FVCEquitySummary).

14. BJ Fogg. *Tiny Habits: The Small Changes That Change Everything*. 1/19/2021. [behaviormodel.org](http://behaviormodel.org).
15. Steve Raney. *PATMA Calendar Year 2019 Annual Report*. [www.bit.ly/PATMA2019report](http://www.bit.ly/PATMA2019report)

## APPENDIX A: ONBOARDING AND USING THE BIKE LOVE APP

### BIKE LOVE COMMUTE INCENTIVES APP



### THE BIKE LOVE CONCEPT

Motion ([himotion.co](http://himotion.co)) and PATMA ([paloaltotma.org](http://paloaltotma.org)) have developed a first-in-the-world “Bike Love” application and commute incentive program featuring five unique aspects:

1. We provide daily incentives for verifiable active mode commute trips for home-to-work and home-to-Caltrain, up to \$600 per year per commuter - \$5.00 per day and \$10 to onboard the app.
2. Geofenced location tracking confirms bike, e-bike, e-scooter, and e-skateboard trips to downtown, California Ave, or one of 30 Caltrain stations. ([See valid areas](#) in Google Maps.)
3. Incentive dollars may be instantly redeemed at local merchants via reloadable Apple/Google Pay Virtual Visa credit cards.
4. By restricting transaction authorization to local merchants, program funds are recycled back into the local economy, multiplying program impact.
5. Persuasive marketing utilizing door-to-door, in-person outreach to 800 businesses encompassing technology, light office, government, and service workers.

Bike Love addresses public transit’s decades-old FIRST MILE problem as expressed by our transit operator partner letters:

- “VTA supports active modes and recognizes the importance of bicycles as a way to extend the reach of transit. One of the greatest challenges we face as a transit operator is the low density of our suburban county and long distances to transit stops.”
- “Caltrain encourages passengers to use sustainable transportation modes including bicycling, to get to and from stations.”
- “Commuter.org’s strategic plan includes a task to ‘encourage more San Mateo County commuters to use bicycling as an alternative to driving alone for both first/last mile commutes as well as full-length commutes.’”

Bike Love scales to other cities and major employer commute programs, increasing transit ridership at no cost to transit operators.

- There are only 11 bike commute incentive programs in the entire US. Bike Love provides the highest amount of incentives, using the most sophisticated technology.

Please take a look at our 80-second [Bike Love explainer video](#):



## HOW DO WE USE YOUR LOCATION AND OTHER DATA? DATA PROTECTION AND PRIVACY POLICY

Our app prefers to track your location **all the time**, rather than just within the app. We are pioneering automated travel mode detection, an important technology in the battle to reduce single-occupancy vehicle trips. Users also have the option to manually start and stop tracking within the application. Our location tracking has a small impact on battery power level.

For coordinated customer support and for survey research, PATMA and Motion share ownership of your email address and mobile phone number.

Motion is a trip activity tracker app headquartered in Rotterdam, the Netherlands, with customers in Europe, Canada, and the US. Bike Love is a Motion/PATMA bike commute incentive program that the app enables.

The Motion app is provided to you by ByCycling International B.V. The app is covered by the California Consumer Privacy Act of 2018 and the European Union General Data Protection Regulation (GDPR). We do not share or sell your personal information. We delete your data when you request account deletion. As far as the use of the Virtual Visa card, our full software stack is Payment Card Industry Data Security Standard compliant.

We prepare status and research reports for PATMA and the federal Transportation Research Board (TRB). Bike Love is TRB Transit IDEA project number T-99.

We will report anonymized data about the impact and effectiveness of Bike Love:

- number of active users in Palo Alto
- number of trips per user per month
- distance traveled
- greenhouse gases saved

- zip code level (there are about 30,000 people per zip code in the Bay Area) map of active trips.

Our reports will never include personally-identifying information like your name, email, street address, or mobile number.

Our 18-page privacy policy can be found here: <https://himotion.co/privacy-policy>. We took pains to create a readable policy document.

## STEP-BY-STEP BIKE LOVE BETA ONBOARDING

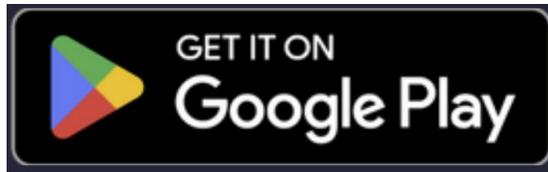
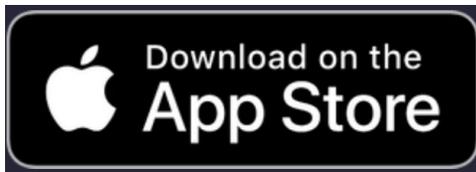
It takes four steps to onboard the app:

1. Download the Motion app
2. Sign up for the Bike Love Program
3. Within the Motion app, join the Bike Love Program
4. Add Virtual Visa Card with \$10.00 to Apple Wallet / Google Pay

Then you can go buy coffee with your initial \$10.00 reward.

### 1. DOWNLOAD THE MOTION APP

Download the “Motion | All Modes Activity Tracker” app to your phone:



If you need to search for the app in the App Store, search with “Motion all-modes tracker” as there are many apps that have “Motion” in the name/description.

### 2. SIGN UP FOR THE BIKE LOVE PROGRAM

Filling out the Palo Alto TMA [Bike Love Application Google Form](#) starts the application process.

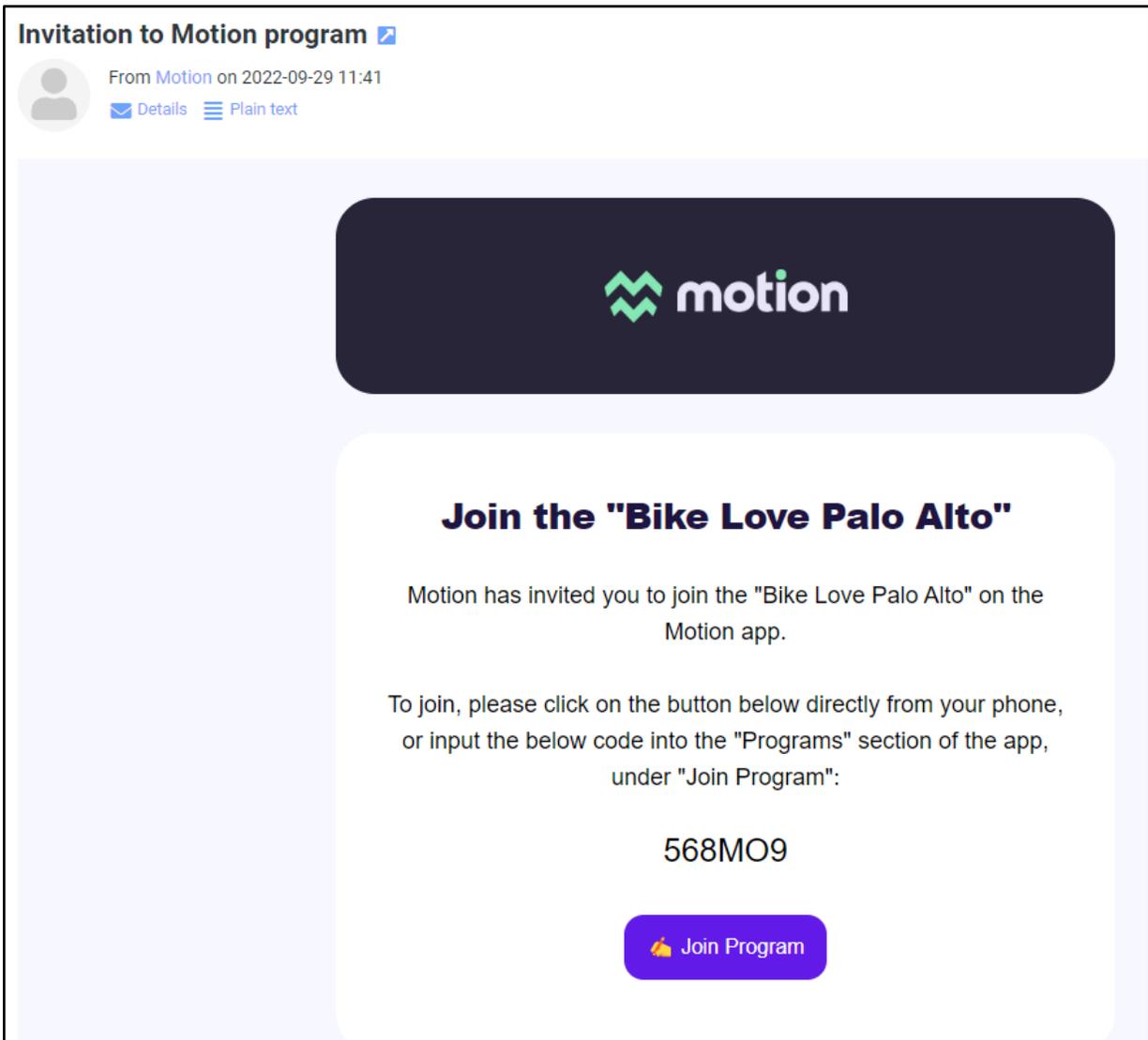


### 3. WITHIN THE MOTION APP, JOIN THE BIKE LOVE PALO ALTO PROGRAM

After signing up, you will receive an invitation by email from himotion.co with the subject line, "Invitation to Motion program" within 48 hours of registering for the Bike Love program.

The email will contain a link that, if you open it from your phone, will automatically join you to the Bike Love Palo Alto program from within the Motion app. Optionally, you will also receive a 6-digit code you can paste into the app using the Programs > "+ Join Program" button, in case something goes wrong.

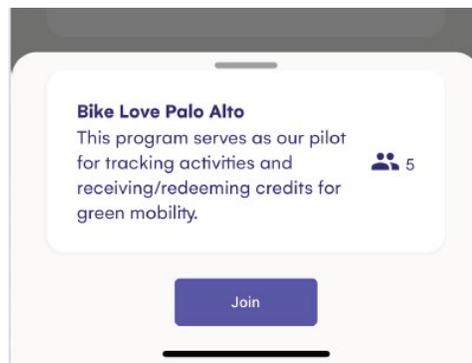
Please check your spam folder if you don't receive the email.



3A. The “Bike Love Palo Alto” program should appear under Programs after loading the app. You can proceed to click on “Join”.

That’s it! You have now joined the program. From now on, every day you make one or more bike trips within the [valid zones](#), you will earn \$5 worth of Credits.

As an onboarding welcome gift, we’ve awarded your account with \$10 of credits that you will need for the next step when issuing your Virtual Visa card.

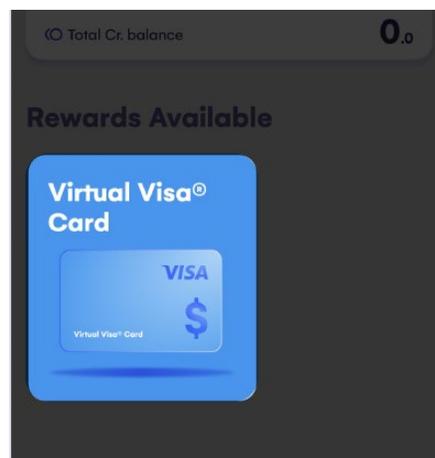


#### 4. ADD VIRTUAL VISA CARD WITH \$10.00 TO APPLE WALLET / GOOGLE PAY

The Virtual Visa reward card is issued by Sutton Bank, member FDIC, pursuant to a license from Visa U.S.A. Inc. It can be used wherever Visa cards are accepted. Terms and conditions apply. Visa is a registered trademark of Visa, U.S.A. Inc. All other trademarks and service marks belong to their respective owners.

4A. Head to the “Programs” tab and tap on the Bike Love Palo Alto program. Then tap on the “Rewards” tab.

Under the “Rewards Available” section; tap the “Virtual Visa Card” option.



4B. Fill out the Virtual Visa Card Issuing form. This is a one-time form to associate your name and address with the Virtual Visa card that is issued by Sutton Bank.

**Card Issuing**

For security reasons we need to request the below details. Please complete the steps to access your card details.

**Billing details**

First name

Surname

State region

City

Street

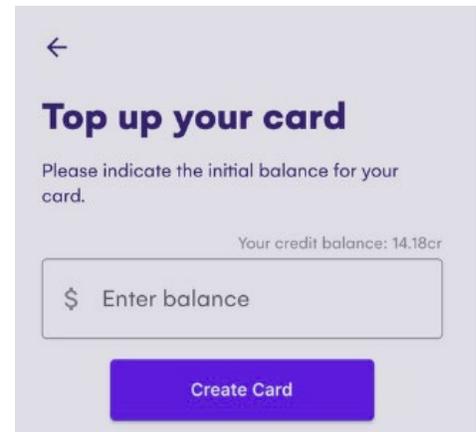
4C. Create your Virtual Visa card, funded with \$10.00 by:

(You have navigated to: Programs > Bike Love Palo Alto > Rewards > Virtual Card > Fund Card.)

Enter a balance of \$10.00.

Tap the “Create Card” button.

Remember, you will earn \$5.00 worth of credits every day you make one or more valid bike trips for the program. As you build up credits, you can “Fund Card” to move Bike Love Credits onto your Virtual Visa card so that you can make expenditures.

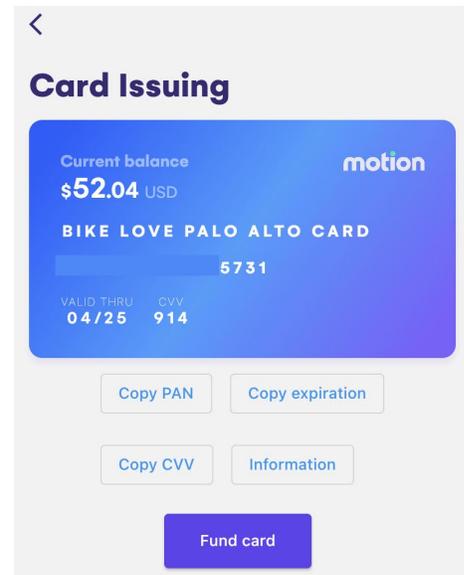


4D. You have now issued your very own reloadable Virtual Visa card. However, we are not done yet.

Next, we need to add your card to Apple Wallet or Google Pay, and verify it. To do this, you will need to add the card manually, so you will copy the details of the card to your Apple/Google Wallet (this process will be automated in the future).

Tap on “Add to Wallet” and write down the card number (“PAN” for Primary Account Number), expiration, and CVV. (You have navigated to: Programs > Bike Love Palo Alto > Rewards > Virtual Card > Add to Wallet.)

Next, go to Apple Wallet and Google Pay apps and find the option to add a card manually.



4E.1. For **Apple Wallet** go to:

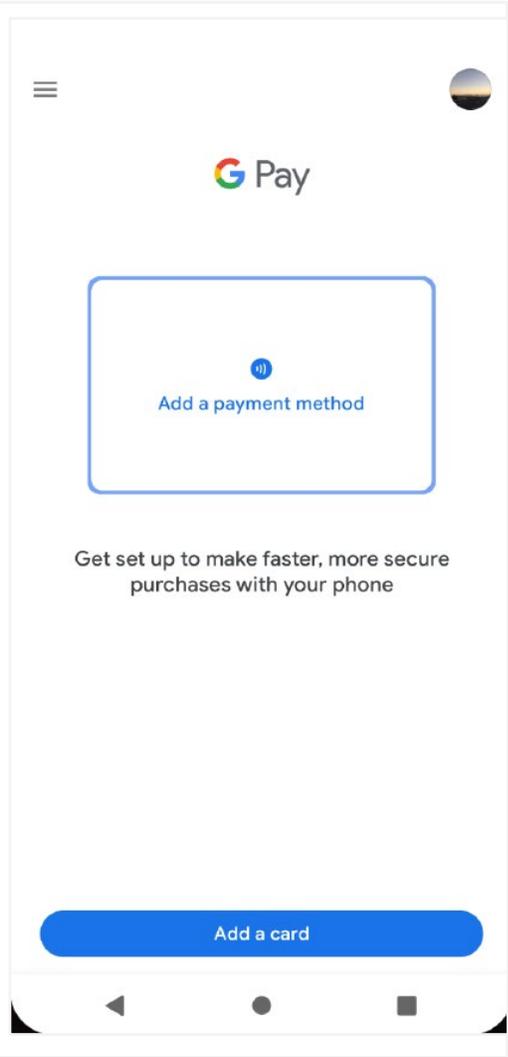
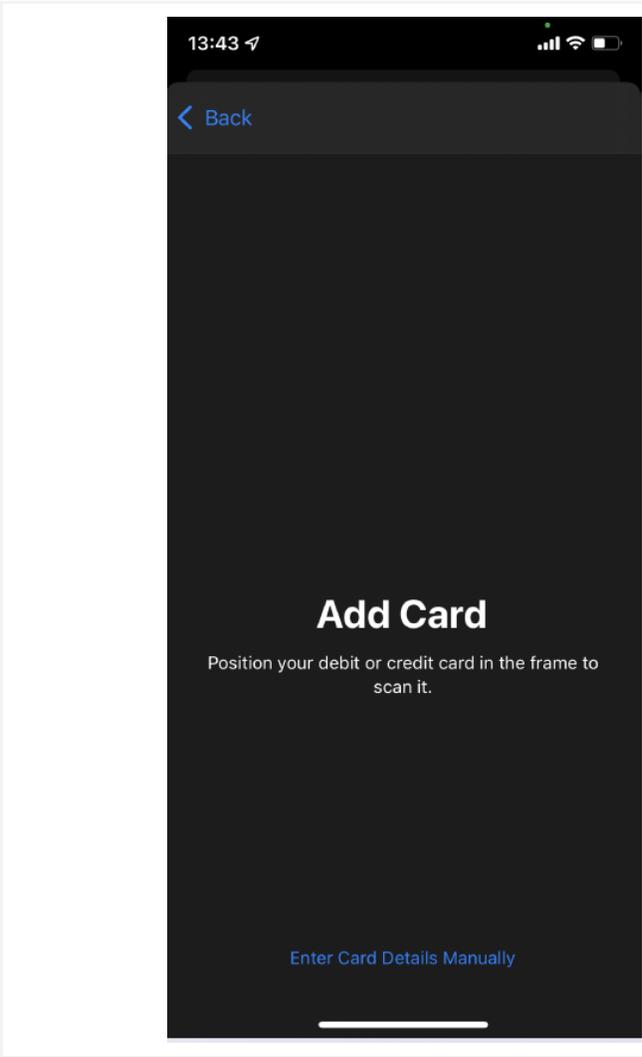
Open Apple Wallet app > Tap on the “+” button > Tap on Debit cards > tap on “Enter card details manually”, and provide the details of the Virtual Visa.

Or follow [these official steps from Apple](#).

4E.2. For **Google Pay** go to:

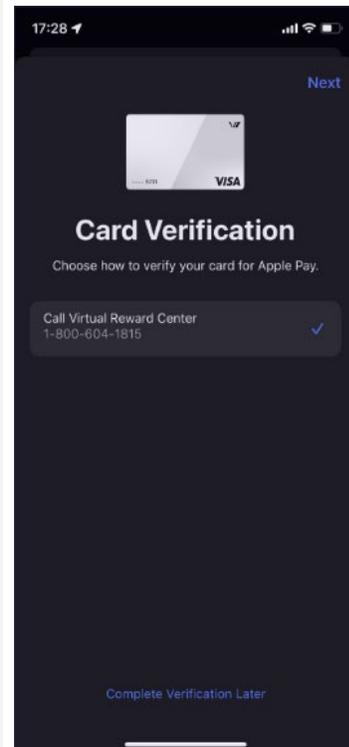
Open Google Pay app > Tap on the “Payments” tab at the bottom > Tap “+ Payment method” > and then “Debit or credit card” > enter the details manually.

Or follow this [Google Pay video tutorial](#).



4F. Google Pay or Apple Wallet may ask you to verify the card. If so, they will provide a phone number for you to call our fintech partner’s Virtual Rewards Center. Make the call and be **very, very sure** to mention that you are verifying “a Virtual Visa card for the Bike Love Program to add to an Apple/Google Wallet.” If the Virtual Rewards Center has any confusion, please escalate because all Virtual Rewards Center staff should have received Bike Love instructions.

Your card should be verified within 24 hours after you call, and ready to Tap and Pay at restaurants, shops, and retailers.



## GO BUY COFFEE WITH THE \$10.00 REWARD

Once your Virtual Visa is visible within Google Pay or Apple Wallet, you may Tap and Pay with the Virtual Visa.

To the right is a typical Apple Wallet. The VI (for Virtual Incentives, our Virtual Rewards Center fintech partner) Virtual Visa x5731 is the default credit card in the Wallet. Note that the VI card in the Wallet is the same card as in the Motion app, but it has a different appearance.

Notes:

If at the moment of payment the cashier asks you for “debit or credit card,” please choose credit card.

If you are asked for a debit card PIN number at the point of sale (we’ve heard reports that this sometimes occurs at Whole Foods Market), please just press the green button as if there is no PIN.



## THANKS FOR ONBOARDING BIKE LOVE

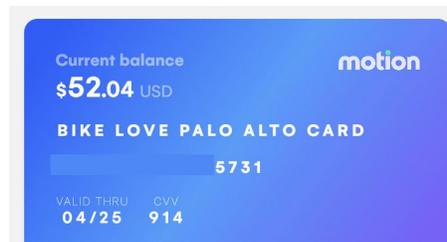
It can be tricky to onboard. It took us forever to get the fintech working. We are happy to:

- Set up a Google Space/Chat.
- Or Zoom (you can share your mobile phone's screen)

to go through any tricky parts. Please ping [steve@himotion.co](mailto:steve@himotion.co) to set this up.

## USING THE APP: VIRTUAL VISA CARD BALANCE CHECK AND FUNDING

You can check the balance of spendable money on your Virtual Visa card via Programs > Bike Love Palo Alto > Rewards > tap the blue Virtual Visa Card. "Current balance" is displayed on the blue Virtual Visa card as in the example below.



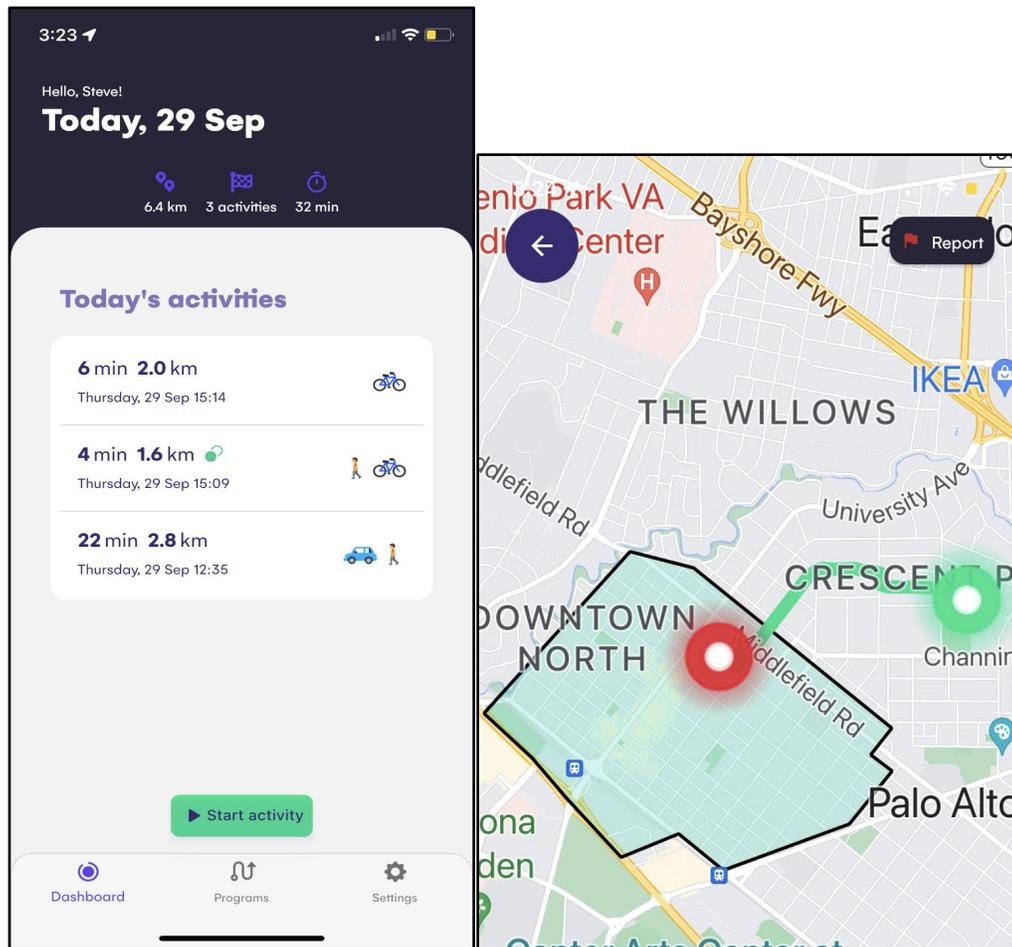
When you Tap and Pay, your Current balance is decreased accordingly.

Reload (Fund) your Virtual Visa card (when you have Bike Love Credits available) via Programs > Bike Love Palo Alto > Rewards > tap the blue Virtual Visa Card > Fund Card.

## USING THE APP'S DASHBOARD: TRACKING YOUR BIKE TRIPS AND EARNING GREEN COINS

When you select Dashboard, Today's activities are displayed. Each time you swipe right on the activities, the previous day's activities are displayed.

In the example below on the left, three activities are shown, one with a green coin denoting that a valid bike trip to/from Downtown Palo Alto, the California Ave area, or a Caltrain station area was detected.



If you tap the trip with the green coin (or any trip), the Trip Map is displayed (the image above to the right). On the Trip Map, travel modes are green for biking, blue for walking, red for traveling in a vehicle (car or train). The example trip starts at the green circle in Palo Alto's Crescent Park area and ends at the red circle in Downtown Palo Alto. The Downtown Palo Alto area (or geofence) is displayed (shaded green) showing that the trip was a valid coin-earning trip. Sometimes it takes a few minutes and some internet connectivity for the geofence to display on the Trip Map.

Within the Trip Map, if you have an issue (the travel mode is incorrect, the trip really should have earned a coin, etc), tap Report to explain the problem. The trip's data is sent with the report.

You may sometimes notice that the Trip Map displays your trip as alternating between biking and walking when you were biking the whole time. We still generally know to comprehend your overall trip as biking.

Besides via Trip Map > Report, you are also encouraged to submit feedback, suggestions, bugs, and issues via this link: [Motion's Feedback & Bug report](#).

## APPENDIX B: PATMA BIKE LOVE SUBSIDY APPLICATION

Accessed from: <https://www.paloaltotma.org/bikelove>



# Bike Love Subsidy Application

Palo Alto Transportation Management Association

### About Bike Love

Bike Love is a commuter program and part of the [Motion mobility platform](#) that allows workers who commute to jobs on University Ave or California Ave in Palo Alto to earn \$5 for each bike commute day, up to \$600/year.

Before registering, please visit our [Bike Love onboarding guide site](#) for more information on how to complete the onboarding process. Here is a [one minute overview](#) of the Bike Love program.

**Eligibility:** University Ave and California Ave workers who do not already bike to work. You can earn incentives by biking to work, OR biking to a Caltrain station and taking the train to Palo Alto. [See all valid areas here.](#)

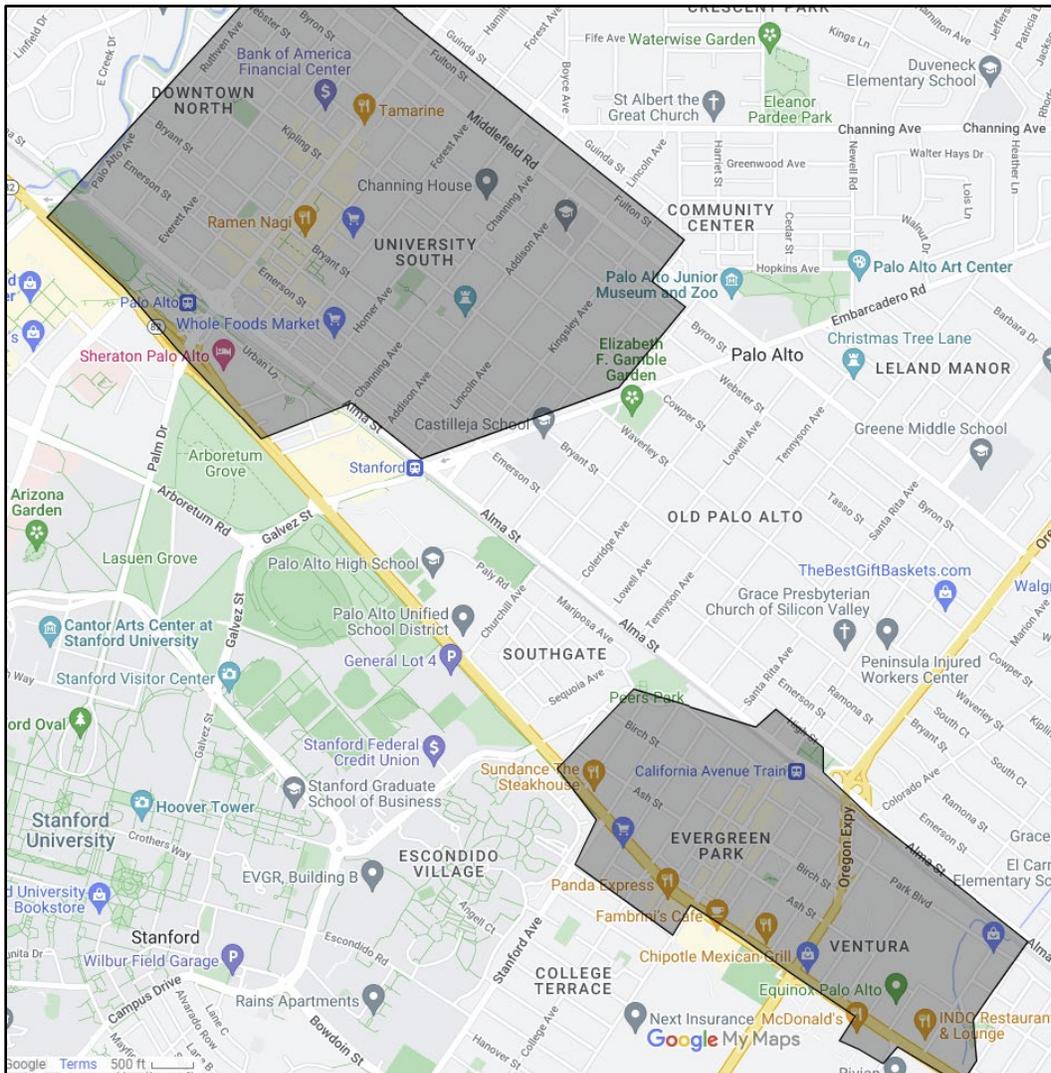
**Bike maps:** Want to know which low-traffic roads are safer for bicycle commuting around town? Check out these [bike maps](#).

**To apply for the Bike Love app, please fill out the following survey questions.**

---

\* Required

Main commute destinations in Palo Alto eligible for rewards
---



Full Name (First and Last)\*

Your answer

---

Home Address (Street Address)\*

Your answer

---

Home City\*

Your answer

---

Home Zip Code

Your answer

---

Work Email Address\*

Your answer

---

Job Title\*

Your answer

---

Work Street Address \*

Your answer

---

Manager's Name (to help identify other employees who could benefit from bicycling incentives)\*

Your answer

---

Manager's Email\*

Your answer

---

Main Phone Number at Work

Your answer

---

Questions or Comments?

Your answer

---

**Signature and Agreement** \*

By typing your name here, you agree to the following:

*\* I do not already bike to work.*

*\* I agree that I will be the only user of this subsidy.*

*\* I agree to share information about my use of this subsidy in order to continue to receive it.*

Your answer

---

Submit Clear form

Never submit passwords through Google Forms.

This form was created inside of ALTRANS. [Report Abuse](#)

Google Forms

**APPENDIX C: STAGE 1 BETA: COMMUTER FEEDBACK**

In the user interface, a valid active mode trip to work or to transit is depicted as “earning a green coin.”

Stage 1 Beta feedback uses special colors and text formatting:

- The author adds text in **purple color** to categorize the software feature area for the feedback.
- **Green text** denotes answers and information sent back to the commuters that provided feedback.
- *Italics & black text* are used to denote the four questions that we provided to our commuters for their feedback.

## **C1. DAN PROVENCE, T-99 EXPERT REVIEW PANEL MEMBER. 9/28/2022**

I did notice that the incentive went up – very nice!

I really like the concept of the app and have been making use of the rewards. There's still work to be done, though. Here are some thoughts:

- **ONBOARDING:** Steve, you talked me through the install, including downloading TestFlight and the app so it wasn't too bad. I'm not sure what it would be like without handholding.
- **VIRTUAL VISA:** I had difficulty using the Virtual Card and had to call the service number a couple of times before it worked.
- **VIRTUAL VISA:** I tried using the Virtual Card at a grocery store for my first purchase. I hadn't used Apple Wallet before so I hit the ATM button and was asked for a PIN. I didn't know the PIN and ended up paying with my own credit card. It turns out I should have hit the Credit Card button and not ATM. Letting people know this would be helpful.
- **INCORRECT MODE:** My biggest issue is that the app is being too generous. I will get a reward just for driving through one of the specified areas. There's no need for me to get on a bike or a train to get the reward. I get a reward for driving to do grocery shopping, which should not be happening.
- Several of the eligible green mapped areas are too big and reward travel that isn't that close to the train station.
- Sometimes my trip and reward eligibility showed up very quickly. Other times it takes a while to show up (more than a day). Consistent, quick feedback for the user would be great.
- Letting people pick imperial units (miles rather than km) was a good feature set improvement.
- **USER DASHBOARD:** I'd be interested in learning more about my overall reductions in CO2 and number of 'good' miles traveled. I'm sure there are some assumptions baked into the overall dashboard page that show total distance covered, CO2 emissions saved, etc. It would be good to be able to find out the assumptions. A personal dashboard feature could be good to add.
- **SPREAD THESE BIKE INCENTIVES:** I think benefits like this should be widespread, as long as they're limited to rewarding wanted behavior. The reward is so good that people may try to game the system if it's not reigned in somewhat.
  - Transit COVID recovery, air quality, public health, and congestion management are all good justification to reward people for biking to the train and riding the train.
- **KEEP BIKES OFF CALTRAIN INCENTIVE:** More targeted rewards programs would be awesome. For instance, Caltrain wants to reward people for riding their bike to the station, parking their bike, and then taking the train. We'd rather not have people take a bike on the train (taking a bike on the train is still great, just not our top choice) so that more space is available for people. I'd love to reward people if we could track them riding a bike to Caltrain bike parking, walking to the

train, riding the train, and then walking/taking a shuttle/taking bike share/similar to their final destination.

Let me know if you have any questions about this. The thoughts above are a little heavier on criticism (meant to be constructive) than praise but my overall experience is much more positive than negative. Keep up the good work!

## C2. ARNOUT B. 9/28/2022

I'd be happy to recommend the app to other cyclists we know. Also looking forward to seeing the research paper!

My feedback:

- **ONBOARDING:** Using an early version of the app the onboarding process was quite complicated. Manually adding the card and placing a phone call to get the card confirmed. I assume this has improved in the later versions.
  - *Answer: Alas, our fintech partner told us to implement SMS card validation, but later said it wouldn't work for us.*
  - *Answer 2: The fintech partner had untrained Virtual Rewards phone confirmation staff who didn't know about the Bike Love Virtual Visa and our beta users didn't know how to direct their staff. Our partner has now trained their staff and we provide onboarding guidance: "Google Pay or Apple Wallet may ask you to verify the card. If so, they will provide a phone number for you to call in (our fintech partner Virtual Reward Center). Make the call and mention to verify your card for the Bike Love Program. Your card should be verified within 24 hours after you call, and ready to be used on Merchant's POS systems, like any other NFC card.*
- **INCORRECT MODE:** Generally, I like the user interface and it is intuitive. However, the **mode share tracking gets it wrong quite often**. Then, to report the activity mode as wrong, the interface is not great and often takes a long time to send the report. One improvement would be to see that the activity mode changes to the correct mode after reporting it as wrong.
- **SPREAD THESE BIKE INCENTIVES:** I think it would be great to spread it to other locations. Train stations, Stanford Research Park, Stanford University, and Stanford Medical Center come to mind.
- One question you might be able to answer using the federal grant: What is the ideal amount of compensation?
  - *Answer: \$599/year because if we go to \$600 we have to collect Social Security numbers and fill out IRS Form 1099 for each user.*
  - *Answer: From a behavioral economics standpoint, there is a US travel price elasticity of demand (Victoria Transport Policy Institute or VTPI has a paper) that enables one calculation. And then today's "activity-based regional travel demand forecasting models" are an impressive achievement in the transportation planning field. They can forecast ridership at different incentive levels.*
- Generally, I am quite pleased with my commute to work. However, I must say that there are a couple of high stress points across the route: crossing Oregon Expressway and especially, crossing El

Camino. Modern protected intersections, no right turn on red, and protected left turns would be needed to improve those locations.

- Considering the last/first mile problem I always like to mention the Dutch public transit bikes (OV Fiets). At Dutch train stations you can rent a bicycle for the cost of a transit ticket per day using your clipper card. You bike to the train station on your own bike (where there is plenty of parking available), and when you are at your destination, you rent an OV Fiets, which you return at the train station when you go home (there is no balancing problem).

### C3. STEVE R. 9/29/2022

**FUND VIRTUAL VISA:** I have \$30.25 in credits, I try to fund Virtual Visa with \$30.25. Result: Unspecified error and a permanent spinning wheel.

- I can fund \$29.00 successfully. The app should only display the amount that I can successfully fund.
- When something goes wrong in an attempt to Fund Card, there should be an understandable explanation, not “unspecified error.”
- When I come back to the Card Issuing screen (“Card Issuing is not an accurate description of this screen), the Virtual Visa still displays with the old balance. I know I can go out to the dashboard and come back into Programs and fix this, but that isn’t how it’s supposed to work. The app should never display the wrong amount that is loaded onto the Virtual Visa.
- On the Card Issuing screen “Add to Wallet” is not an accurate description because I can press that button just to get the Virtual Visa card number and other details.

From an earlier report: **FUND VIRTUAL VISA: INSUFFICIENT BALANCE:** The credits UI should be easier to understand, the user should not be given the option to attempt to fund the Virtual Visa with an amount that is too large and will fail. Don't make the user build a mental model of the fee structure (\$2.50 to create a Virtual Visa, \$0.25 per “add funds to Virtual Visa” transaction.) The app should suggest the maximum the commuter needs to top up their Virtual Visa. The app logic should never submit a value to Virtual Incentives for an amount that will fail. The user should see credit amounts that already have the fees subtracted.

- *Answer: This works better as far as the card creation fee being already subtracted in the official App, but the \$30.25 Fund Card example above still fails.*

**IN THE APP STORE, APP IS HIDDEN:** Topic: Finding Motion in the iPhone App Store

The search term “Motion” is weak. Motion doesn’t appear in the first 20 App Store apps displayed.

With the search term “Motion All modes tracker” the app appears as the second app. Searching for “himotion.co” returns zero results. This is an indication that the rebranding to “Motion” from “CashByCycling” was not as successful as it should have been.

**TOO MANY ONBOARDING STEPS:** Given the problems onboarding users, should “Bike Love Palo Alto” be a separate app that is one particular configuration of Motion | All Modes Activity Tracker?

- (This is an interesting idea, but PATMA needs to qualify commuters via their application. Not just anyone can download Motion and start obtaining rewards from PATMA.)

**EARNING (OR NOT) A COIN IS CONFUSING:** How do people know to press their trips in Dashboard > Today’s Activities to see the trip map? How does a user discover this hidden but very important feature?

## **Steve R, 8/22/2022**

Issue 1: **VIRTUAL VISA VERIFICATION IS DIFFICULT**: When Apple/Google Pay require the commuter to verify their Virtual Visa by phoning Virtual Incentives' Virtual Rewards Center,

- the commuter doesn't know what to ask
- Virtual Rewards Center staff are unfamiliar with how to successfully process this rare request to add a Virtual Visa to Apple/Google Pay.

This is an unproductive situation where each side does not have sufficient information to succeed.

A solution was achieved by Motion escalating the problem to Aileen Banks at Virtual Incentives.

- Motion's Jose Diaz's query: Aileen, can you please advise if there is something we can do to 'train' our users to say to VI customer support when they call? I can imagine our users will mention something like "I'm calling to verify my virtual card for the Bike Love program", so it would be great also if VI becomes familiar when our users call. Just want to make sure the conversation flows as smoothly as possible.
- Aileen: You can advise commuters to say "I'm calling to verify my virtual Visa card for (Apple Pay/Google Pay) for the Bike Love program." I also added some program notes for our call center so they are aware of this language.

Issue 2: **VIRTUAL VISA VERIFICATION IS DIFFICULT**: VI had indicated to Motion that an easier path to Virtual Visa verification could be implemented via SMS. Upon further investigation, VI indicated that the easier path was not available for Bike Love commuters:

- 8/4/22: Aileen Banks: After further investigation, it's been determined that the SMS verification feature for mobile wallets is only fully functional through our typical cardholder activation process and further development work would be needed for it to be utilized with an auto-activated Visa product like ByCycling is using. We apologize as my team did not realize this was the case when providing the instructions earlier this summer. We'll keep you updated on when the additional development work is planned to be done. In the meantime, cards can still be added to mobile wallets, they would just need to be verified using the call-in option.

Issue 3: **VIRTUAL VISA VERIFICATION IS DIFFICULT**: For one user, it took 4 days for the Virtual Visa to be verified.

- 8/8/22: Aileen Banks: I confirmed with my team, and having the card verification completed within a 24 hour period is a completely reasonable request, and should happen within this time period the majority of the time. A case where it could take longer is if the request comes in late on a Friday or over the weekend. Our support team's hours are Mon-Fri, 8-8 ET. Also, I confirmed that these requests do have to be routed to another department, however that department confirmed with me that this verification process is a quick one, once the request reaches them.

Issue 4: **SETTINGS ISSUES**: "approximate location" setting in the Android OS. Jameson W, with an Android phone, had his location setting set on "approximate location." This was not sufficiently accurate to ascertain whether he was validly traveling within one of our geofences.

- **FEATURE REQUEST:** Detect “approximate location” setting in Android OS and warn commuters to change away from that setting. Jameson W. was able to manually change the setting and report back: “Automatic trip detection now seems to be functioning as intended. Upon further investigation I believe my phone was previously only allowing approximate location and is now allowing accurate location.

#### C4. BRUCE A., 9/29/2022

*QUESTION: What was your onboarding experience like, from downloading the app to making your first purchase with the Virtual Visa?*

- **ONBOARDING:** Onboarding was a while ago. I was able to set up the app reasonably easily. But I had trouble joining the “Bike Love Palo Alto” program. I don’t think I got the first email. Once I asked for a second email I was able to register.

*QUESTION: What do you think about the app’s user interface, maps, and commute mode tracking?*

- **USER DASHBOARD:** I wish the dashboard showed me how many recent trips I had made that were eligible for payment, and probably what my current balance is.
- **INCORRECT MODE:** I find the logic for classifying my trips as walk/bike/drive to be pretty bad. Most days I just ride my bike to work, and those generally show up as walking and biking. And on the weekends when I do a longer ride on my road bike, I will often see the trip classified as bike and drive (drive usually corresponds to a downhill on the bike).
- **LOCATION TRACKING:** Finally, I find it disconcerting that the app can track where I am all the time. I understand that the app needs that in order to be able to record trips automatically, but it’s just a bit unnerving. I don’t have any good ideas on how to fix this. You are offering cash rewards, so perhaps that will be enough to overcome people’s concerns about this. I know you have the ability for folks to manually start and stop recording, but that is just too much hassle to use.
  - *Answer: We have logged a feature request (shared by another user) about using the auto-tracking mode. Anyone who has access to the data could easily find where I live and work, and anywhere I’ve been, even if the trip is by car. For privacy-protecting home and possibly workplace, a random “hidden” radius could be set by the user (like the Strava app). It also might be a good idea to automatically (or have an option to) discard any trips that are entirely by car (wouldn’t qualify for the reward) or that don’t enter the geo-fenced area.*

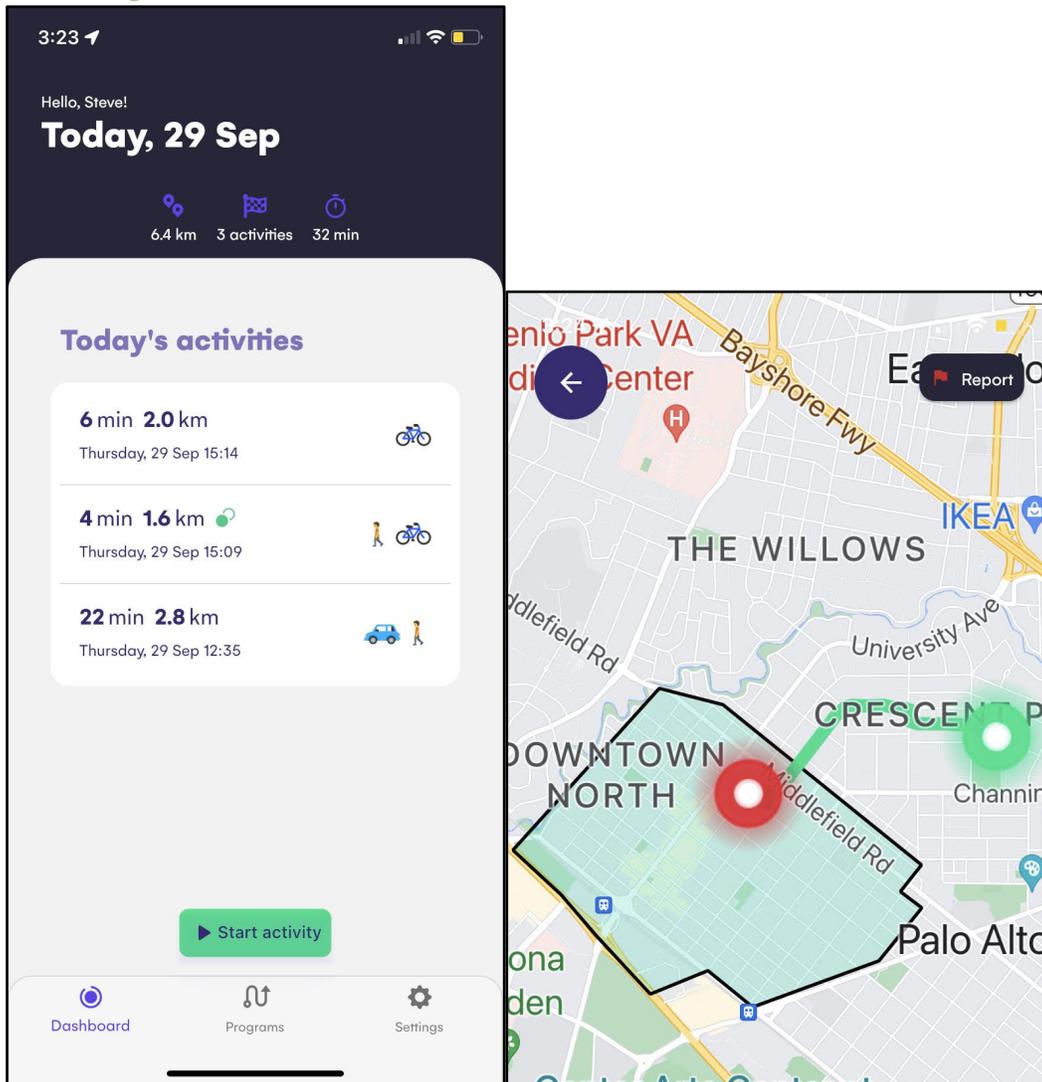
*QUESTION: Can and should bike commute incentive programs be spread to other locations? There are only 11 other US bike incentive programs. Compared to Bike Love, the incentives are smaller and for a shorter duration than Bike Love.*

- **SPREAD THESE BIKE INCENTIVES:** I think incentives to bike are great, so I would like them in other locations.

General thoughts about “bike the first mile to transit” and “bike directly to work” commuting? Obstacles, incentives, frustrations, etc.

- **EARNING (OR NOT) A COIN IS CONFUSING:** I think the program needs a better definition of what rides are eligible. When I read “Program Rules and Rewards” I expected that I would get two reward trips a day, and I was disappointed when I did not.

- *Answer: Agreed! We're not exactly building up a mental model of how the hardware, software, and geofences work in the user's mind.*
- **EARNING (OR NOT) A COIN IS CONFUSING:** Also, there should be an easy way to see which activities received a reward, or were eligible for a reward in case you have more than the \$5 day limit. Maybe a user notification after I finish an activity that earns rewards would be nice.
  - *Answer: Great idea about a notification - Strava provides notifications!*
  - *Answer: In my second trip today, I earned a green coin for a valid bike trip into the geofence. In Dashboard > Today's Activities, when I tap on that trip, I see my trip map (travel modes are green for biking, blue for walking, red for driving) with the geofence displayed. We do **not** guide the user to press the trip to see the map, so the trip map is a hard-to-discover feature. Two screen grabs:*



- **EARNING (OR NOT) A COIN IS CONFUSING:** I thought all of my commute rides would earn rewards, and they do not. But more frustratingly, I don't know which ones did earn rewards and why. I think the best way would be to add some UI in the Dashboard Activity List showing which rides earned rewards and which ones did not.

- *Answer: One small thing we did was to make the green coin much more visible than in the past.*

## **C5. JUSTINE B., 9/28/2022**

Overall the onboarding wasn't too bad considering it was a beta. I think the Bike Love app is cool and I love telling downtown workers about it as I'm talking up the commute survey. Below are answers to your questions.

**ONBOARDING:** QUESTION 1: What was your onboarding experience like, from downloading the app to making your first purchase with the Virtual Visa?

I would have benefitted from a quick overview of the main onboarding steps:

1. download Motion app
2. then download the Bike Love app
3. set up Google Pay (which I did not have)
4. set up Virtual Visa card
5. link Virtual Visa card to Google Pay
6. redeem rewards and when the checkout asks for a PIN just hit Enter

There are substeps within each of these but knowing the broad brush strokes would have helped me envision what I was trying to accomplish. The Bike Love onboarding guide gives the detailed breakdown which is helpful.

QUESTION: What do you think about the app's user interface, maps, and commute mode tracking?

- **INCORRECT MODE:** User interface is simple. Commute mode tracking **misidentifying the mode** undermined my confidence in the app, but does it really matter which mode it thinks I took if I get my \$5/day reward?
- **INCORRECT MODE:** E-bike mode detection: We are seeing 50% of our e-bike trips at 12 to 18 mph being incorrectly detected as car trips by Android.
- **FURTHER RESEARCH NEEDED:** Will there be a need to have user settings to help differentiate between car and e-bike trips?
- **TRIP MAP:** I don't recall seeing Trip Maps in the app.
  - *Answer: How do people know to press their trips in Dashboard > Today's Activities to see the trip map? How does a user discover this hidden but very important feature?*

QUESTION: Can and should bike commute incentive programs be spread to other locations? There are only 11 other US bike incentive programs. Compared to Bike Love, the incentives are smaller and for a shorter duration than Bike Love.

- **SPREAD THESE BIKE INCENTIVES:** This app should absolutely be offered in other places. The more cyclists on the road, the safer I will be when I cycle.

QUESTION: General thoughts about "bike the first mile to transit" and "bike directly to work" commuting? Obstacles, incentives, frustrations, etc.

- I usually mention them the other way around. You can bike to work if you live just a few miles away so you don't need to repark every 2 hours or you can use it to bike to a Caltrain station and then take Caltrain to work.

## C6. SHANNON M.

It's a bit hard to remember the beginning after what -- six months?

**ONBOARDING:** Downloading the app and getting started wasn't too hard, but it never felt intuitive/easy. I didn't realize until recently that I could switch from kilometers to miles. For a long time I'd occasionally use my phone to convert the kms to miles. Now it's set for miles.

**TRIP MAP:** I recall being confused about the trip colors as the app didn't provide an explanation. It's also been strange sometimes that the mode will show me on my bike, then it will shift to blue briefly, then shift back to green -- yet I was on my bike for the whole distance. This happened occasionally when I was riding across town. It could have been happening at stop lights, but it seemed inconsistent. Perhaps the app thought I switched modes because I was stopped for a minute or two? A couple of times it showed me running but I'm not a runner.

- *Answer: You are correct, the app's color scheme changed to now do the "right" thing:*
  - *Green is good so that's biking*
  - *Red is bad, so that's driving.*

**VIRTUAL VISA:** Getting the virtual credit card to work was not intuitive. I think the main thing I'd say about the MOTION app in beta form is that it was not intuitive. Maybe it would have been easy for a techie, I have no idea.

**USABILITY:** Today I received a message for the Official "Launch" of Bike Love Palo Alto. I went ahead and joined the official app. It appears that the app now includes explanations for using it. Those weren't available in the beginning. It was sometimes confusing.

**DATA PRIVACY:** In reviewing the new Bike Love Palo Alto Onboarding Guide, I see references to privacy and that makes me unhappy. It indicates that my info will be shared/sold to other entities. Sounds like I will have to hunt around in the app to discover where I might switch off cookies. I think info regarding privacy should be prominent and very clear. I hate websites that bury their cookie choices in pages of dense verbiage.

## C7. NICOLE R

**FALSE NEGATIVE FOR BIKE TO CALTRAIN:** Trips that pass through or change modes within a geo-fenced area, but do not originate or terminate in the geo-fenced area are not counted towards rewards. This may not be relevant for the eventual use case if it is only to reward trips that begin/end in Palo Alto business districts. However, if trips that involve multi-modal transit (such as biking to/from Caltrain) are to be rewarded, and don't necessarily begin or end in a geo-fenced area, the auto-tracking mode is basically useless.

- *Answer: This has been fixed in the official application.*

**RANDOM APP LOG OUT:** The app periodically logs out the user and requires logging in again. After logging in again, all previous activities are no longer shown in the app.

- *Answer: This has been fixed in the official application.*

**EARNING (OR NOT) A COIN IS CONFUSING:** Understanding which activities contribute to rewards, and how much (dollar amount) is extremely difficult and confusing.

- **FALSE POSITIVE:** The "two overlapping circles" green coin icon appears on activities that start and/or end within the geofenced areas of the map, but can appear for activities that were taken by any mode, including car, which shouldn't count for rewards.
- **EARNING (OR NOT) A COIN IS CONFUSING:** Generally, there's no indication on a given activity of how much reward is earned for the activity. Which activities earn a reward and how much should be very clear to help incentivize the user to earn more rewards. Display the reason?
- **EARNING (OR NOT) A COIN IS CONFUSING:** Multiple coins earned in a day:
  - depict a "valid trip" that doesn't earn a coin, like a gray coin.
  - need to explain for the program, only 1 trip per day can earn a coin.
  - "explain the reasons, etc"

**TRIP MAP:** The geofenced area overlay does not appear on the map for activities that do not start/end inside the geofence. I assume this is intentional to indicate that the trip did not "qualify" but it's a little confusing when I expect that a trip should have start/end in the geofence, or if I don't know where the geofence is and don't yet have any trips that start/end in the geofence. Maybe the geofenced area overlay could be a different color when it's "inactive".

- *Answer: In the official application, the Trip Map shows the geofence, even when the trip is not valid. Likewise the Trip Map is shown even when the trip mode is by vehicle.*

**EARNING (OR NOT) A COIN IS CONFUSING:** Swiping between mode segments on the activity map view (gray boxes at the bottom) is an undiscoverable UI feature. There should be visual clues to indicate that swiping is a possible gesture in this view to show more information.

- *Answer: The "mode segment" interface has been removed in the official application; however, we still have the problem that the Trip Map is a hidden feature.*

**UNTAPPABLE BUTTONS:** The pop-up/overlay titled "This is what we found since you last opened the app" cuts off the list of previous activities and there is no way to scroll to see the cut off activities. This UI element should be adjusted so that it either scrolls to show all of the previous activities, or only shows the number of activities that fit on the screen (or has some way of indicating that there are more activities, but they can't be shown). [see screenshot]

- *Answer: This is fixed in the official application.*

**UNTAPPABLE BUTTONS:** It's possible to scroll the activity view so that the start/stop activity button is behind the menu bar at the bottom of the screen, and can't be easily pressed. [see screenshot]

- *Answer: This is fixed in the official application.*

**DATA PRIVACY:** Generally, the app is very privacy invasive, especially when using the auto-tracking mode. Anyone who has access to the data could easily find where I live and work, and anywhere I've been, even if the trip is by car.

**FUTURE FEATURE REQUEST:** For privacy-protecting home and possibly workplace, a **random "hidden" radius** could be set by the user (like the Strava app). It also might be a good idea to automatically (or have an option to) discard any trips that are entirely by car (wouldn't qualify for the reward) or that don't enter the geo-fenced area.

- *Answer: Great feature request! Also, the backend can be set up so that Motion employees can't see the data with your location, in the same manner that WhatsApp can't read your messages.*

## **C8. TERRY B., 4/15/2022 - 18 MPH RACING BIKER**

### **Bugs descriptions:**

**TRIP MAP:** "I noticed that the first 250 meters of my ride today was not tracked. I am not sure if this is intentional for privacy reasons or the app was just slow to wake up. App was on, phone was in my backpack. I started riding but no tracking for first 250 meters. The rest of the track was accurate."

- *Answer: This level of accuracy is usually fine for an accurate commute trip validation.*

**IMPERFECT MODE DETECTION:** "36.7 km ride was classified as mix of walking, bike and car. Trip was all by bike"

**UI USABILITY:** "On the App, I liked the old design slightly better. The data displays were denser, so I saw more information on each screen, especially the summary. The display by day breaks it into several screens."

**IMPERFECT MODE DETECTION:** "For my rides, I often see a segment in the middle of the ride displayed as a car trip. Today's ride to Palo Alto was broken up into numerous segments. There is no index for the color coding of the route.

**CONFUSING UI:** The meaning of the no wifi icon is not clear especially next to the mode icons."

**TRIP MAP:** "Color coding of route on map was confusing. Route was in red, green and purple. An index under each symbol in the summary box might explain the meaning of the colors. "

- *Answer: In the official app, we changed the colors to be more intuitive: Green (good) for biking, blue for walking, red (bad) for driving. We also document the colors in the Onboarding / User Guide. But more is needed to make this more apparent.*

**FEATURE REQUEST:** "Add elapsed time of activity to the summary screen. Currently only the distance is displayed. The total elapsed time for the trip should be displayed next to the start time in the trip summary "

- *Answer: Fixed in the official app*

**FEATURE REQUEST:** "I like seeing only bike trips. An option to suppress display of modes which I am not interested in tracking would be nice. I am only interested in bike trips most days. So I would rather suppress other trips as a preference."

**C9. BIKE LOVE TRB 2023 PAPER - RELEVANT PEER REVIEW COMMENTS, SEPTEMBER 2022**

This program provides an excellent example for TDM programs seeking to incentivize bicycle commuting, an important yet oft neglected area of TDM. As an experienced TDM professional I understood the concepts and the challenges.

The mechanics of processing card transactions are rarely mentioned in TDM literature. I'm glad to see these mechanics referenced, especially PCI compliance. It's good that verification plays an important role in the program. Many TDM programs fail to consider these mechanisms.

Overall, I am impressed with the program, especially attention to the back-end. The program should serve as an easy to replicate example to other TMA's.

## APPENDIX D: STAGE 2: 9/27/2022-11/29/2022 FEEDBACK

### D1. VTA'S LAUREN LEDBETTER, T-99 EXPERT REVIEW PANEL MEMBER, 11/22/2022

Question 1: What was your onboarding experience like, from downloading the app to making your first purchase with the Virtual Visa? Would the multi-step onboarding work for your constituents?

*I had difficulty with the multi-step process. I was using an Android phone and the screenshots shown in the instructions were not exactly what I was seeing on my phone. I also was doing it quickly and thought the code showing on the screenshot was the code I was supposed to enter. It didn't work and I had to go back and re-read the steps/the email to realize I had my own unique code. Suggest putting a disclaimer on the screenshot. I appreciated the onboarding emails reminding me to do it. I needed them. I liked the step-by-step instructions.*

*I could do this, but it took some time. I think you might lose unmotivated people in the multi-step process, especially the steps related to setting up the virtual card.*

*I suspect this may be difficult for people who aren't super-savvy with phones, older people, and limited English speaking populations. And people who detest forms and multi-step processes. I happen to not mind them.*

*For me, it was a 5 on a ten point scale in terms of difficulty – ten being the easiest.*

Question 2: What do you think about the app's user interface, Trip Maps, and commute mode tracking?

*It was easy to understand and use. I really liked the interface. Simple, easy to move around.*

Question 3: How about that Virtual Visa?

*See answer to #1. This was the most irritating process because I had to set up Google Pay on my phone first – so I had to set up an app to get another app to work. Once it was set up, and once I figured out how to transfer earned credits (another issue here) it worked fine. I was able to purchase within my zone. I didn't test it outside the zone. But once it was set up and I understood the process of transferring credits it was fine.*

*Transferring credits: this didn't work the first time and I got no information from the app as to why it wasn't working. Turns out, there is a service fee that I needed to take into account – I couldn't transfer my entire credit amount over. Thankfully, an email from you all helped me figure it out and I was able to do it no problem after that. I would appreciate having the transfer fee integrated into the transfer.*

*Earning credits: I got my \$10 for joining and some credits for biking to work. The first trip worked as expected. My second trip ended up earning more credits than I expected. My third trip ended up only giving me partial credits because I stopped midway through to help someone and it only counted the last leg of my trip. Oh well. On the third trip, I also didn't get credits for a return trip because I forgot to turn the app on and it registered my e-bike ride as a vehicle trip. I couldn't override it.*

Question 4: Can and should bike commute incentive programs be spread to other locations? There are only 11 other US bike incentive programs. Compared to Bike Love, the incentives in the other programs are smaller and for a shorter duration than Bike Love. In a world with enough bike program funding for your organization, what would you like to see?

*My personal opinion: I really enjoyed earning credits for the trip. I felt it was a lot of money for a bike ride. But I'm not sure if I would have been motivated for less. I did make the decision to bike into work more because I wanted to earn the cash.*

*I felt the pilot was promising, and I would love to see it expanded. Some questions/thoughts about a larger roll-out:*

- 1. How could you design the app to shift behavior (bike more) instead of reward people for something they already do? There are racial and social equity implications in this question: People who currently bike tend to be older, whiter, more wealthy, and are more likely to be male than the general population. Would it be fair to pay this group to do what they already do?*
- 2. (I am not a marketer, but...) I think the marketing should not focus on the environmental or congestion-relief aspects of an incentive app, but rather on the benefits to the individual user. If it focuses on "do this to help others/society", then people could see it as too pushy, too controlling, too out of touch. If it instead is a way for people to integrate more activity into their lives, track it, and incentivize themselves, then it may have a much larger audience while still supporting the core transportation mission. You may also have more funding options if you relate it to health instead of transportation. (What if you can get paid 50 cents for walking your dog, but \$5 for commuting to work – you get badges/challenges/more levels for doing different, harder things)*

Question 5: How could portions of the Bike Love technology be applied to your organization?

*I wonder if VTA could use an app like this to motivate/gamify taking transit. Each time you ride the bus you earn credits for a free transit pass or you earn cold hard cash. Something like that.*

Question 6: General thoughts about "active/bike the first mile to transit" and "bike directly to work" commuting? Obstacles, incentives, frustrations, etc.

*I will give you my personal perspective.*

*Obstacles: family obligations, household obligations, medical appointments, anything that requires me to compress my commute to as short as possible prevents me from biking to work. Family obligations mean I often can't bike even when I want to because I need to be somewhere at a specific time before or after work..*

*Energy. If I am tired, I don't bike to work. Getting an e-bike reduced this issue. When I have time and energy, I love to bike to work.*

*Other general obstacles: cost of living, esp housing means people have to live very far from where they work.*

*Safety – I have a safe bike commute, but that is not luck. When we moved to our current place, we looked for neighborhoods where I could reasonably bike to work on bike lanes/trails. Most people don't consider that when choosing a place to move.*

*Incentives: Biking to work boosts my mood, I get a hit of nature on the trail, I feel accomplished, I feel energized and awake when I get to work. It is my favorite part of the day. The extra \$\$ for the incentive app was really nice. It did increase my motivation to bike.*

Question 7: Compare the features of Bike Love to other apps and commute incentive programs.

*I like the simplicity of Bike Love. I'd work on perfecting the current system before rolling out other features (like Pokemon Go does – start easy, then roll out more and more stuff).*

*I really enjoy incentive apps, so I may not be your typical person. Some thoughts:*

- *Cash is more of an incentive for me than badges or competitions.*
- *I enjoy the team aspect of the team bike challenge that we have had in past years in the Bay Area for Bike to Work Day.*
- *There are other apps like one we did through work several years ago that incentivize exercise and healthy eating by having you move along on a virtual trail with checkpoints along the way. That was cute but not a ton of motivation for me.*
- *Noom has daily small tasks, activities, and lessons to support exercise and healthy eating. Maybe something to incentivize the little steps to getting on a bike: pump up your tires, ride around the block, test ride your trip to work on the weekend, pack your bag the night before, lay out your bike helmet, RIDE!*
- *Another trip tracking/incentive app drained my battery so fast I had to disable it. Bike Love didn't drain as fast, and I appreciated that.*

**Lauren Ledbetter**

Senior Transportation Planner, Bicycle and Pedestrian Program  
Santa Clara Valley Transportation Authority, San Jose, CA

**D2: AILEEN BANKS, WITH FINTECH PARTNER VIRTUAL INCENTIVES, 11/14/2022**

Question 1: What was your onboarding experience like, from downloading the app to making your first purchase with the Virtual Visa? Would the multi-step onboarding work for your constituents?

Great, the app was easy to download and navigate. Once the Motion team fixed the error I was receiving when trying to generate my Visa card, I was able to successfully access the card details. Overall, the app was easy to set up and the tracking was able to start immediately with no waiting time.

Question 2: What do you think about the app's user interface, Trip Maps, and commute mode tracking?

After a few times using the app, I was very comfortable with the interface and Trip Maps. The activity tracking page was well designed and fun to reference back to after a bike trip.

A few feedback items:

- Initially I wasn't sure if I needed to click "Start activity" in the app to actually track an activity. I then learned that the app will automatically start tracking motion. It would be helpful to include a note on that page stating this.
- My bike ride on 11/10/2022 wasn't tracked as biking. I believe the app logged it as driving. I thought this was odd since I had done a very similar ride earlier in the week, which tracked it as biking no problem.

Question 3: How about that Virtual Visa?

Great! I haven't had a chance to add it to my mobile wallet yet, but wanted to share that the initial \$10.00 sign up payment was added to the Visa with no problem. After all my biking trips, my Credits Balance remained at \$0, so I didn't see how I was supposed to add more funds to my card. Maybe this is a bug?

Question 4: Can and should bike commute incentive programs be spread to other locations? There are only 11 other US bike incentive programs. Compared to Bike Love, the incentives in the other programs are

smaller and for a shorter duration than Bike Love. In a world with enough bike program funding for your organization, what would you like to see?

This type of incentives program should definitely be more available across the US, especially in big cities where biking can continue to expand as a form of transportation. With the technology that Motion has built, organizations (both public and private) can easily scale this program with minimal start up efforts.

Question 5: How could portions of the Bike Love technology be applied to your organization?

At my company Virtual Incentives, not many employees are within bikeable distance to the office, however a handful of employees can bike to a train that takes them into town. I could see my company using the technology to encourage walking or biking during, before, or after work hours near the office. I could also see this as a fun way to incorporate contests/competitions in the workplace.

Question 6: General thoughts about “active/bike the first mile to transit” and “bike directly to work” commuting? Obstacles, incentives, frustrations, etc.

I believe that “active/bike the first mile to transit” and “bike directly to work” commuting is a great idea and could apply to many people that live in a city close to their employer. I could see the program working a little differently depending on the city and how safe the biking routes are.

Question 7: Compare the features of Bike Love to other apps and commute incentive programs.

I haven't had the opportunity to try out other apps yet.

### **D3: ANNA EDWARDS, FINTECH PARTNER VIRTUAL INCENTIVES, 11/14/2022**

Question 1: What was your onboarding experience like, from downloading the app to making your first purchase with the Virtual Visa? Would the multi-step onboarding work for your constituents?

Downloading the App and Joining the Program was super easy! The email link did not work so I had to go in and click the Programs tab and then manually input the Code to join the program, but that was super easy to do.

The way you set up the Virtual Card within the Program could have a little more of an explanation about how the credits can be added as money to the virtual card. I saw some information about credits on the Overview tab, but I think it would be more helpful to have that information on the Reward tab.

The “Automatic tracking” should be turned OFF as the default setting. I didn't like that it started to track my location every time I left my house, so I had to turn it off. I think you should be able to set the location setting to “While using the App” instead of “Always” accessing my location, even when I am not biking.

The default setting for Units should also be set to “Imperial” since most people seem to use miles and not kilometers.

I also had some issues receiving the credits for a few of my rides. Overall, it is a simple and easy app to use, and I really enjoyed helping test it! Thank you!

Question 2: What do you think about the app's user interface, Trip Maps, and commute mode tracking?

Overall, the App's user interface is simple and easy to figure out. I do think it would be helpful to show in Real Time what your mileage and time is. You must click “Stop Activity” in order to see how far you've cycled.

Question 3: How about that Virtual Visa?

The Virtual Visa is very easy to use, the “copy” button makes it easy for you to input the card information into your Apple Wallet. The only issue is if the business does not have Apple Pay.

Question 4: Can and should bike commute incentive programs be spread to other locations? There are only 11 other US bike incentive programs. Compared to Bike Love, the incentives in the other programs are smaller and for a shorter duration than Bike Love. In a world with enough bike program funding for your organization, what would you like to see?

Yes, I think bike commute incentive programs should be spread to more locations. I think it helps make people more active and choose to bike over taking their cars.

Question 5: How could portions of the Bike Love technology be applied to your organization?

Virtual Incentives provides the Virtual Visas for the Bike Love App, but I think our employees would also enjoy using the app. We have quite a few bikers!

Question 6: General thoughts about “active/bike the first mile to transit” and “bike directly to work” commuting? Obstacles, incentives, frustrations, etc.

I think biking to work or biking anywhere in general is a great way to commute, but with any type of transportation there will be obstacles and frustrations, such as road closures, sidewalk closures, objects in the way, sweating before work, etc. Overall, I still think it’s a great concept to incentivize biking as a way of commuting.

Question 7: Compare the features of Bike Love to other apps and commute incentive programs.

Like I mentioned above, it would be nice if you could see in real time what your mileage and time is while you are riding like most other biking apps have. Added bonus would be able to track calories and heart rate too.

## APPENDIX E: RESPONSES TO EXPERT REVIEW PANEL FEEDBACK ON FIRST DRAFT FINAL REPORT

### FEEDBACK FROM SUZIE EDRINGTON

Thanks again for your perseverance! Great results and can't wait to see down the road how this progresses as technology improves/ comes available.

1. Add project objectives and workplan for reference

- Now that better data is available, we added new Sections 5a - 6g covering the work plan and deliverables in detail. Comparing results to the original targets and hypotheses.

2. Add to conclusion a high level summary of accomplishments (as relates to work plan), then your lessons learned, and add how project moves industry forward (as relates to IDEA program goals).

- Added new Sections 8a and 8b
- Moving the industry forward is covered in Section 7a Product Payoff Potential and Section 7b Product Transfer

3. Search for: “2a. Project Background and Motivation”

- Suggest to include the original T-99 Project Objective, Workplan and Deliverables in the Background Section 3 to provide context and to compare to what was accomplished.
- In Sections 5a - 6g, we now cover the work plan and deliverables in detail, comparing results to the original targets and hypotheses.

4. Search for: “The Bike Love Project Kickoff Meeting was held on 2/16/2021. At the kick-off meeting, attendees were polled about factors that would popularize biking in the Bay Area. (7).”

- If reading correctly the reference (7) cites webinar on 11/2020 poll. Suggest to include date of poll and number of individuals that answered each question in results. The statements that participants agreed ... is not apparent in Figure 1 - perhaps include % Participants Average Rating from Scale of 1 to 5 (define 1 to 5)
- Clarified to:

**2A4. What will it take to make biking take off in the Bay Area?**

Bike commute incentives such as those Bike Love provides are only one of six key elements that can increase bicycle commuting. The Bike Love Project Kickoff Meeting was held on 2/16/21. At the kick-off meeting, attendees were polled about factors that would popularize biking in the Bay Area, based on a previous webinar on the topic. (7).

Nine Kickoff Meeting attendees responded to Poll #1, on a scale of 0.0 for not important to 5.0 for extremely important. The weighted average of the nine responses were calculated and showed that improved bike infrastructure was the most crucial element, followed by a change in biking culture (Figure 1). Attendees agreed that subsidies are useful to incentivize a cultural shift in biking. The

5. Search for “3A. Bike Love Innovation”

- To clarify - is the project a pilot or a long-term initiative?
- PATMA has a strategic objective to have some sort of a bike program. The Bike Love project is a PATMA pilot with an aspiration to become a long-term initiative. The funding of PATMA during COVID has been low, but new money may be provided.

- May add "consistent with the project objectives." Suggest to add under 3 and above 3A the original T-99 objectives, workplan and deliverables.
- In Sections 5a - 6g, we now cover the workplan and deliverables in detail, comparing results to the original targets and hypotheses.

6. Search for “resulting in Scoop providing a substantial refund to PATMA. With that in mind, Bike Love implements robust technology to verify commute mode.”

- Great to have "catches." I was administrator at Houston Metro over taxi program and saw lots of creative fraud that we kept adding to our catch algorithms - good to try to catch
- Your comment was included because another reviewer moved to strike.

7. Search for “We grew our set of research partners to twenty, including Transportation Research Board, American Public Transit Association, public transit operators (Caltrain, VTA, LA Metro, City of Palo Alto).”

- Good number of partners - what is the breakdown of how partnered? Some endorsements, testers, incentives, users?
- 12 provided support letters, 12 attended kickoff meeting, 9 will attend the 11/30/2022 project wrapup meeting, 6 are on the ERP, 9 test and provide feedback. On fintech, we have frequent interaction with Virtual Incentives and VI handles the relationship with Sutton and Marqeta.
- I added prose explaining this.

8. Search for “Our Austin and Los Angeles partners provide augmented potential to scale beyond the Bay Area.”

- Sentence revision "to scale beyond the Bay Area" does not apply to Austin.
- Changed to: We are spreading the word about the Bike Love project in various ways in hopes of transferring Bike Love or parts of the concept to other locations. We will:
  - publish a Bike Love paper in Transportation Research Record
  - present a Bike Love poster at TRB 2023
  - introduce the project to CUTR’s transp-tdm listserv
  - make a LinkedIn post about Bike Love
  - encourage our project partners to expose the concept to their networks

9. Search for “8. Conclusions and Lessons Learned”

- Suggest to conclude with reiterating the project objectives, tasks and accomplishments, then lessons learned, and last describe how project results moves the industry forward in terms of IDEA Program objectives

## **FEEDBACK FROM SYLVIA STAR-LACK**

1. Search for “public transit operators (Caltrain, VTA, LA Metro, City of Palo Alto, Commute.org, Austin Capital Metro Transit)”

- City of Palo Alto was but isn’t current a transit operator
- Implemented your recommendation

2. Search for “Caltrain (commuter rail) spread PATMA’s low-income transit pass program to 14 new locations via their Go Pass Donation Program. (3).”

- I would re-write this as it sounds like the PATMA service area has expanded in geographic scope. What has happened is that Caltrain has replicated the model developed by PATMA in 14 new locations by creating their Go Pass Donation Program.
- Implemented your recommendation. “Caltrain (commuter rail) has replicated the PATMA transit program model in 14 new locations by creating their Go Pass Donation Program.”

3. Search for “3A. Bike Love Innovation”

- It would be clearer to mark which one is Innovation #1 and which is innovation #2. I can’t tell what is an innovation in this item.
- Fixed! In Section 3A, we now provide the arguments behind why we claim to have implemented eight original innovations and we look forward to being challenged on our claims.

4. Search for “Figure 2:U.S. TMA & Employer Bike-to-work incentives”

- Aren’t there more employers providing biking incentives? The City of Palo Alto provides a \$20/month bike incentive through Navia Benefit Solutions (GoNavia). This sentence should be re-worked to clarify the point you’re trying to make. Is this a sampling of typical bike commute incentives? Or a sample range of typical bike commute incentives?
- I added this footnote: “We queried CUTR’s transp-tdm listserv of 2,000 TDM professionals to crowdsource these 10 bike-to-work programs. There may be more.”

5. 6. Search for “resulting in Scoop providing a substantial refund to PATMA. With that in mind, Bike Love implements robust technology to verify commute mode.”

- This is unnecessary.
- Another Expert Review Panel member reviewer lauds this passage: Great to have "catches" - I was administrator at Houston Metro over taxi program and saw lots of creative fraud that we kept adding to our catch algorithms - good to try to catch.
  - Hence this passage will stay in because the other reviewer cited specific professional experience.

6. Search for “The project prefers users to allow their location to be tracked all the time, rather than just within the app. Especially for project **mid-point users**, such permission allows the app to detect false positives (you take a drive but we think it is a bike trip) and false negatives (you bike but we think it is a car trip). Users also have the option to manually start and stop tracking within the application.”

- What does this mean? Are these users who are actively using the app now? Or users who are in the middle of a commute? Are these beta testers?
- Fixed. Clarified to just “The project prefers users to allow their location to be tracked all the time, rather than just within the app. Such permission allows the app to detect false positives (you take a drive but we think it is a bike trip) and false negatives (you bike but we think it is a car trip). Users also have the option to manually start and stop tracking within the application.”

7. Please use “bicyclists” or “bicycle riders” rather than bikers throughout.

- Fixed 10 instances.

8. Search for “School at 1310 Bryant Street is just outside of the qualifying geofence, whereas an active trip with a destination at The Learning Center, 459 Kingsley Avenue, qualifies.”

- Can I game the system by biking into the downtown area, staying there for some amount of time, then biking out to Castilleja School, and get rewarded for the brief time I was in the Downtown zone? How long do I have to be in the geofenced area to get a credit?
- In the Scoop fraud example, I believe one person had multiple mobile phones and carpooled with themselves. In China, programmers figured out how to fool the Uber app into thinking that the phones were taking car trips when the phones were stationary in the programmer’s office. It wouldn’t be good practice for me to suggest how to fool Bike Love in a public document, but yes, I’m sure there’s a way to fool the Motion app.

9. Change “80% of PATMA’s target commuters” to “Eighty percent of PATMA’s target commuters”

- Fixed!

## **APPENDIX F: RESEARCH RESULTS**

Two page summary (see next page)

Active  
Modes

DECEMBER 2022

Program Steering Committee: TRB IDEA  
Program Committee

Project Title:  
Bike Love Active Mobility Incentive App

Project Number: T-99

Start Date: February 1, 2021

Completion Date: November 31, 2022

Product Category: Mobile apps for  
commuting

Principal Investigator:  
Justine Burt  
Palo Alto TMA  
[justine@paloaltotma.org](mailto:justine@paloaltotma.org)

## Bike Love Fintech Commute Incentives

*Can \$600 per year incentives increase “active first mile” to transit? Active connotes bike, ebike, e-scooter, and e-skateboard.*

### WHAT WAS THE NEED?

Bike Love addresses public transit’s decades-old First Mile Problem as expressed by our transit operator partner letters:

- “VTA supports active modes and recognizes the importance of bicycles as a way to extend the reach of transit. One of the greatest challenges we face as a transit operator is the low density of our suburban county and long distances to transit stops.” VTA stands for Santa Clara Valley Transportation Authority.
- “Caltrain encourages passengers to use sustainable transportation modes, including bicycling, to get to and from stations.”
- “Commuter.org’s strategic plan includes a task to ‘encourage more San Mateo County commuters to use bicycling as an alternative to driving alone for both first/last mile commutes as well as full-length commutes.’” Commuter.org provides TDM programs and services to San Mateo County.



### WHAT WAS OUR GOAL?

- Recruit 90 active commuters over six months and measure usage and program retention.
- Recruit 50 local merchants to accept mobile Bike Love incentives.

### WHAT DID WE DO?

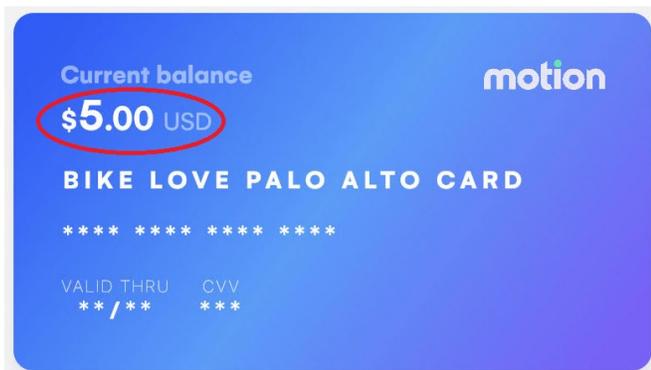
Palo Alto TMA implemented a new cross-platform mobile app that provides daily incentives for verifiable active mode first-mile commute trips to transit and active mode commutes from home to work, up to \$600 per year per commuter. Automated travel mode detection identifies bike, e-bike, e-scooter, and e-skateboard trips. Commute trips are verified to stop or start within geofences at 30 Caltrain (commuter rail) stations and two Palo Alto job centers. Incentive dollars are instantly redeemed at local merchants via reloadable Apple Wallet Virtual Visa cards, a new type of payment card. 67% of incentive dollars are spent in Palo Alto, recycling funds back into the local economy. Rapid program growth was achieved by a persuade-to-join-program commute survey and via door-to-door outreach to 800 small businesses.

### WHAT WAS THE OUTCOME?

In only eight weeks, our marketing outreach motivated 106 Palo Alto workers to join our project. Commuter retention was 60%, above our 50% retention expectation. The software team discovered and implemented improved fintech, enabling Tap and Pay at all merchants accepting Apple Pay.

There were 158 Virtual Visa transactions at 90 different merchants worth a total of \$2,355 with an average transaction amount of \$14.90.

The project was overwhelmed by onboarding issues. Only 33 out of 106 commuters completed the entire seven-step onboarding process. For future software releases, numerous improvements to the onboarding process have been identified.



### WHAT IS THE BENEFIT?

The platform provides exceptional data, metrics, and at-a-glance program snapshots, providing powerful trend analyses and actionable insights for Commute Program Managers.

From our assessment, once onboarding issues are addressed, Bike Love and portions of the technology are ready to spread. We expect:

- Another transportation incentive program will implement reloadable Virtual Visas.
- Another TDM program will adopt PATMA's door-to-door persuade-to-join commute survey.
- Bike Love will spread to additional cities.

### LEARN MORE

80-second product explainer video (Vimeo):  
<https://bit.ly/BikeLoveExplainer>

5-minute research wrap-up video (Youtube):  
<https://bit.ly/BikeLoveWrapup>

T-99 Bike Love Final Report (Google doc):  
<https://bit.ly/BikeLoveRep>

