SEAMLESS TRANSIT

How to make Bay Area public transit function like one rational, easy-to-use system

Contents

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How to make Bay Area public transit function like one rational, easy-to-use system

Executive summary

The Bay Area has more than two dozen different public transit operators — and yet only 3 percent of all trips here are made using transit. Despite significant spending on building and maintaining transit — and in contrast to the crowding along some key corridors — overall ridership has not been growing in our region. How can we get more benefit from our transit investments and efforts?

In many ways, having so many different transit systems makes it harder for riders to understand and use the services available to them. From divergent maps, schedules and fares to uncoordinated capital planning and investment, the fragmented nature of our transit system makes it less efficient, less usable and less likely to help us meet our goals for a thriving and sustainable region. Meanwhile, as Bay Area cities work to orient new housing and jobs around transit rather than the car, they face the challenge of coordinating growth with multiple transit agencies and transit planning processes.

By integrating our many public transit services so they function more like one rational, easy-to-use network, we have the opportunity to increase the market share for transit and make better planning decisions for the future of our region.

We have identified five barriers that our region needs to overcome in order to improve the transit experience for riders:

Poor information about how to make a multi-operator trip

A lack of sufficient information deters potential riders, who don't want to take the risk of being stuck at a transit station without knowing what to do next. Complicating the issue, each transit agency in the region has a unique nomenclature to describe its transit services, unique transit vehicles, unique maps and unique wayfinding signage with a distinct graphic style. ⚙

Difficult transfers between operators

Many of the region's transit hubs were not designed for easy transfers. Connecting from one operator to another can present complex navigational challenges, difficult walks or long waits. Transfers can be physically demanding, and pathways or waiting areas at transfer hubs can feel unsafe and uncomfortable.

Financial penalties for riders using more than one operator

Fare structures differ from operator to operator, which can discourage riders from making multi-operator trips. Existing fare passes establish loyalty to specific operators, rather than to a regional transit system. Evidence from other cities indicates that strategic coordination in fare structure and methods of payment can boost ridership.

Limitations of the fare payment technology

The current Clipper fare payment system has removed a barrier between operators. The technology reflected the state of the practice when it was designed in the late 1990s and early 2000s, but it cannot easily support many of the features that riders have come to expect, such as mobile ticketing or the ability to add value to a card in real time. Many fare discounts aren't supported by the Clipper technology.

Gaps in the region's transit network and duplicative services

As a result of fragmented planning, riders face gaps in transit service, whether it's a long wait at a transfer station or the absence of transit service between important locations. At the same time, transit agencies duplicate each other's services in certain corridors.

Sergio Ruiz

Our vision for a seamless transit network

With a truly seamless network, people in the Bay Area would know how their regional transit system works. Great local transit would be highly visible and leveraged as the building block of a strong regional network. New transit infrastructure would be designed for easy connections. And new transit service would be directed to the routes where there was demand, even if they crossed operator service boundaries.

How do we get there? Many metropolitan regions around the world have created transit systems where different operators function together like one network. Learning from them, we know that successfully integrating transit systems depends on three things:

1. A focus on improving the customer experience

2. Leadership, trust and sustained partnership

3. Business practices that improve collaboration and revenue generation

Consolidating some transit operators might be part of the solution, but a focus on mergers can be a distraction from the many other ways we can work with the system we have.

SPUR proposes five strategies for integrating transit services across the Bay Area:

Strategy 1: Help travelers understand the value of the region's transit system and how to use it.

Bay Area public transit services should be marketed as one system in order to help travelers make better use of available services. This effort should target greater consistency in visual styles, service names and symbols across operators. To increase regional transit ridership, the Metropolitan Transportation Commission (MTC) should lead development of a commonly used regionwide transit map.

Strategy 2: Standardize fares and develop passes that encourage use of the region's entire transit system.

MTC should work with operators to develop integrated regional transit passes and other fare products that maximize regionwide transit ridership. Fare revenue from a regional product should be shared among operators, and temporary funding should be set aside to compensate operators for any losses that may occur when fares are integrated. The fare payment system should offer mobile ticketing and rider loyalty programs, and it should integrate with other transportation costs, such as car sharing and bike parking.

Strategy 3: Develop transit hubs that make transferring easy.

Well-designed multi-operator stations can attract riders to the transit system and help make them feel more comfortable, relaxed and informed. The transfer experience at hubs can be continually improved. Integrating transit hubs into neighborhoods will reduce the need for transit services to get people to the station.

Strategy 4: Use an integrated approach to transit network design.

Looking at transit service in an integrated way can lead to quicker, less expensive and more effective solutions to meeting demand. For example, a corridor-based planning approach might allow us to solve rush-hour congestion problems in the Bay Bridge and Peninsula corridors. We recommend that regional transit expansion investments be made in the context of the entire network.

Strategy 5: Use institutional practices to promote integration.

Transportation agencies should develop better capacity to work with data and to improve the design of the transit customer experience. Having fewer operators in the region would make all types of integration efforts easier. To promote those mergers that make the most sense, local, regional, state and federal funding programs could be altered to incentivize consolidation. ⚙

> **See pages 50–51 for a plan of action identifying the parties responsible for implementing these recommendations.**

The Bay Area needs a more integrated public transit system

The Bay Area's prosperity is threatened by fragmentation in the public transit system: Riders and decision-makers contend with more than two dozen transit operators. Inconsistent transit experiences and disjointed planning and investment make our transit system less efficient, less usable and less likely to help us meet our goals for a thriving and sustainable region.

The Bay Area economy and labor market is increasingly regional: 29 percent of Bay Area commuters cross a county boundary to get to work each day.[1] These long commutes, many of which traverse the bay, put incredible stress on constrained transportation corridors. Two-thirds of Bay Area commuters drive to work alone, creating significant congestion on the region's freeways and bridges. Dramatic growth in employer-run shuttles over the last few years demonstrates the demand for alternatives, both to car travel and to regional transit such as BART and Caltrain, which are running short on room for passengers. As people move further out to find affordable places to live, we expect this regional travel trend to grow.

For these reasons and others, such as managing sprawl and reducing greenhouse gas emissions, the

Bay Area invests heavily in transit. We are spending $21 billion over the next 25 years to build public transit infrastructure and $159 billion to operate and maintain the transit system.[2] Despite similar expenditures in the past, overall transit ridership has not been growing in the Bay Area, as shown in Figure 2 on page 10. Part of the reason it's hard to increase transit ridership here may be due to how fragmented our system is compared to others.

Many will benefit from integrated transit

Today's level of transit fragmentation has serious social impacts for the region. Most trips within the Bay Area are still made by car, with transit accounting for only 3 percent of all trips.[3] We have the opportunity to increase the market share

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[1] Just over 1 million of the region's 3.5 million workers work in a different county than the one in which they live. The share varies greatly by county: Alameda 35 percent, Contra Costa 42.3 percent, Marin 35 percent, Napa 21.7 percent, San Francisco 24.6 percent, San Mateo 41.8 percent, Santa Clara 13 percent, Solano 40.6 percent, Sonoma 16.1 percent. Source: American Community Survey 2013. This does not include trips made for other purposes such as socializing, shopping or going to school.

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[2] Source: MTC/ABAG, Plan Bay Area (July 18, 2013), http://planbayarea.org/plan-bay-area/final-plan-bay-area.html
[3] 2010–2012 California Household Travel Survey Final Report (California Department of Transportation, June 1, 2013), http://www.dot.ca.gov/hq/tsip/FinalReport.pdf

As regional travel grows, traffic congestion is increasing, especially during commute hours, as shown in this Google traffic map captured on a Tuesday at 6 p.m. The vast majority of these trips are taken by single-occupant automobiles. Integrating transit could make it a viable option for more trips.
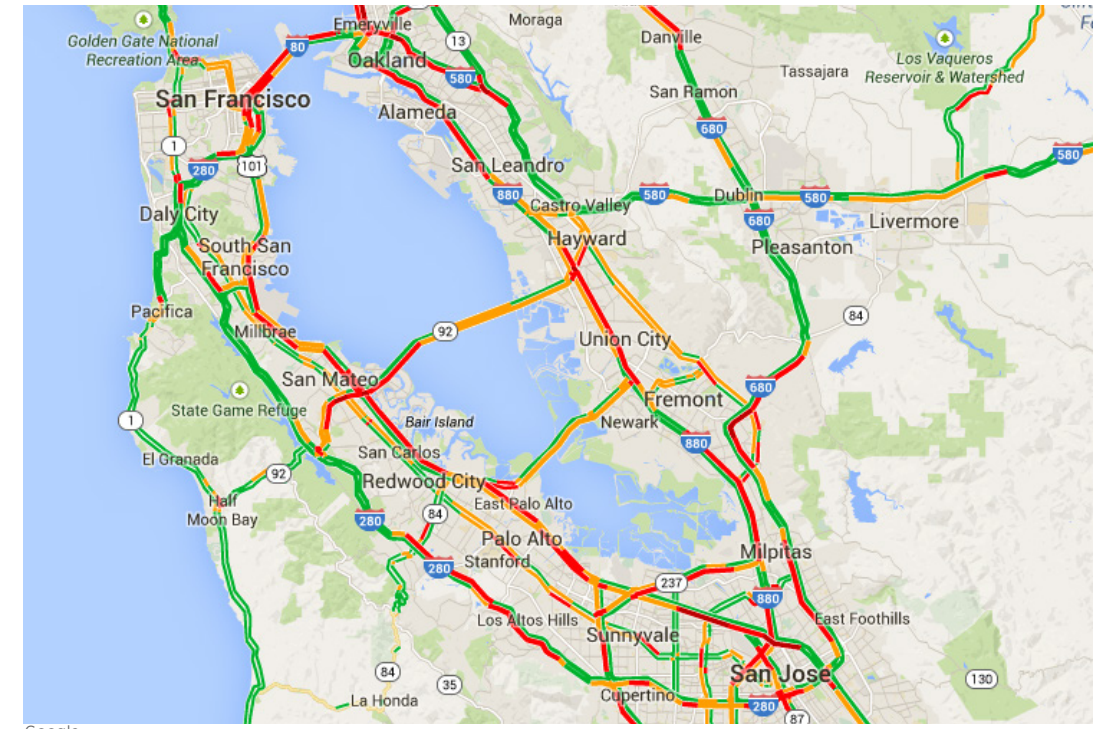
Google

for transit in places where there is significant demand for regional travel. For example, half as many people travel from central Alameda County to San Francisco as travel from the Peninsula/Silicon Valley/San Jose to San Francisco. However, 44 percent of the Alameda County trips use public transit while just 17 percent of the Silicon Valley trips use public transit.[4]

For the large segments of our population who can't afford to own cars or who do not have the physical or cognitive ability to drive, access to integrated transit means access to the same opportunities that those with cars have; better transit would help these members of the community meet their social needs and enjoy all that the region has to offer.[5]

Fragmented transit may exacerbate many of our housing challenges, and integrating it could be part of the solution. Areas like the Peninsula and inner East Bay are already oriented around major transit lines, and yet much of the growing transit infrastructure there remains uncrowded.[6] A more

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[4] SPUR analysis of regional transit market shares, based on Metropolitan Transportation Commission regional travel demand model and Plan Bay Area projections for 2015.
[5] Fredrik Alexander et al., _Job Displacement and the Duration of Homelessness: The Role of Spatial Mismatch_ (Center for Economic Studies, April 2014), http://www2.census.gov/ces/wp/2011/CES-WP-11-30R.pdf
[6] Plan Bay Area would result in a transit utilization (percent of seat-miles filled) increase from 21 percent daily in 2010 to 33 percent in 2040. See: _Plan Bay Area Draft Environmental Impact Report_ (MTC and ABAG, April 2013): 2.1–37.

seamless, more useable regional transit network could open up infill development opportunities across the region — without adding more traffic.

SPUR's research shows that there are many beneficiaries of integrated public transit, including:

- **Customers,** who experience increased ease of travel as well as greater transit availability and reliability.

- **Businesses and institutions,** which are able to attract workers from across the region to job sites and meet their sustainability goals.

- **Cities,** which can encourage travelers to use transit rather than other transportation modes, enabling more mobility for residents and workers, more livable streets, higher-density housing or jobs with less parking and less pollution.

- **Transit operators,** which can better manage demand, respond to contingencies and manage system expansion costs. Operators can potentially reduce operating costs through coordinating resources, sharing expenses and collaborating for greater buying power. Transit agencies may have greater access to funding and greater public support.

- **Taxpayers,** who receive greater social or environmental benefits from the resources they put into the transit system.

FIGURE 1

Bay Area Public Transit Agencies
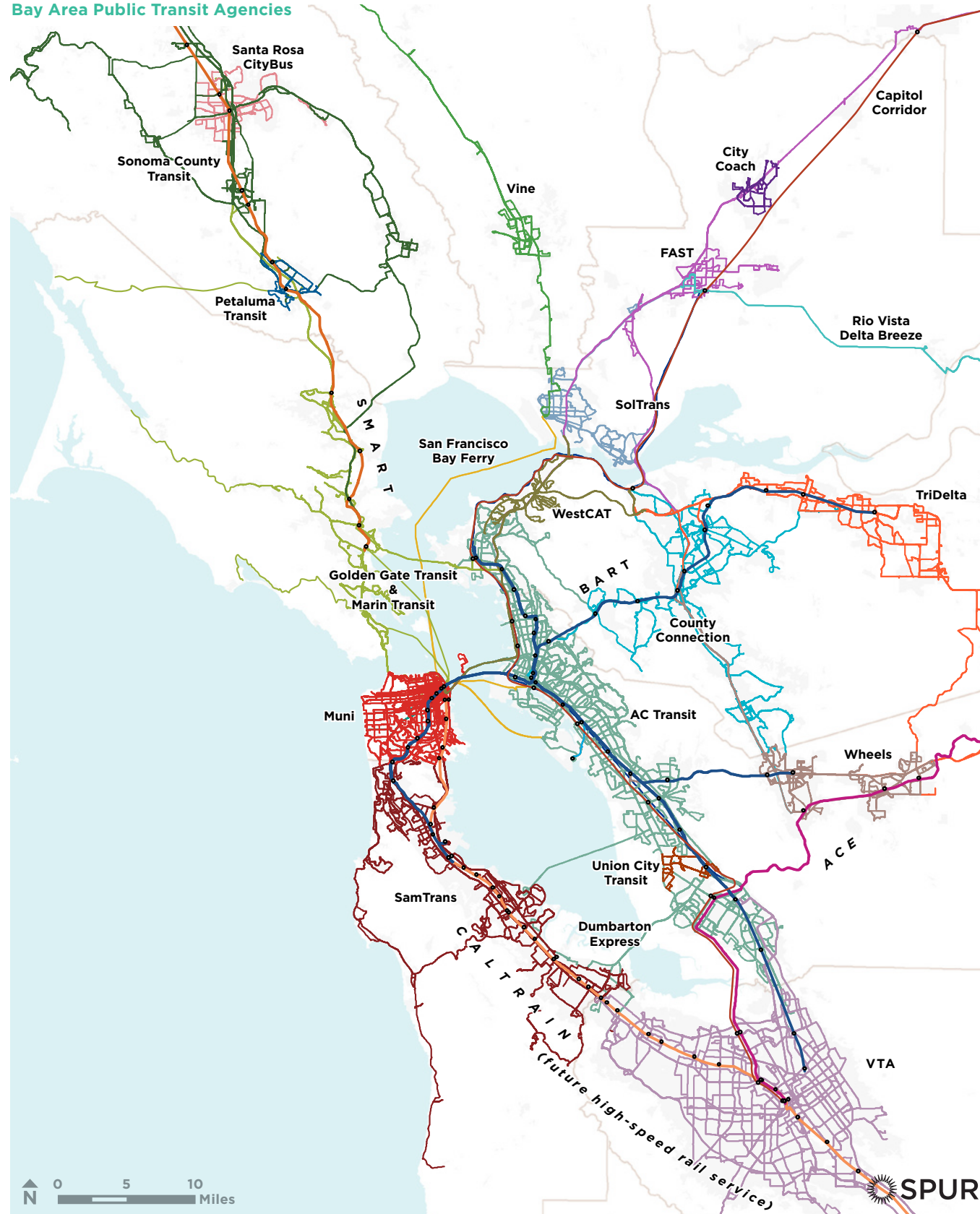
Source: Metropolitan Transportation Commission, SPUR analysis.

FIGURE 1

Bay Area Public Transit Agencies

The Bay Area has an exceptionally large number of transit agencies. The agencies described here represent the vast majority of the region's public transit ridership and all receive some regional, state or federal subsidy. The "Big Seven" (Muni, BART, AC Transit, Caltrain, VTA, SamTrans and Golden Gate Transit) each have annual ridership over 9 million. The remaining 16 agencies carry only four percent of the region's transit trips.

Primary Transit Brand(s) *Governing Transit Agency*	Transit Types	Year Formed	Annual Ridership[14]	Total Annual Costs[15]
Muni *San Francisco Municipal Transportation Agency*	Bus, trolley bus, light rail, historic streetcar, cable car, paratransit	1912	223,701,000	$684 million
BART / *San Francisco Bay Area Rapid Transit District*	Heavy rail	1972	126,603,000	$569 million
AC Transit, Dumbarton Express *Alameda–Contra Costa Transit District*	Bus, paratransit	1960	55,235,000	$327 million
VTA / *Santa Clara Valley Transportation Authority*	Bus, light rail, paratransit	1972	44,244,000	$320 million
Caltrain / *Peninsula Corridor Joint Powers Board*	Heavy rail	1992	15,596,000	$112 million
SamTrans / *San Mateo County Transit District*	Bus, paratransit	1975	12,446,000	$114 million
Golden Gate Transit, Marin Transit[16] *Golden Gate Bridge, Highway and Transportation District, Marin Transit*	Bus, ferry boat service, paratransit	Bridge District 1928, Marin Transit 1964	9,203,000	$105 million
The County Connection *Central Contra Costa Transit Authority*	Bus, paratransit	1980	3,297,000	$31 million
Santa Rosa CityBus / *City of Santa Rosa*	Bus, paratransit	1958	2,809,000	$11 million
Tri Delta Transit *Eastern Contra Costa Transit Authority*	Bus, paratransit	1977	2,741,000	$21 million
Wheels / *Livermore Amador Valley Transit Authority*	Bus, paratransit	1986	1,727,000	$15 million
SolTrans / *Solano County Transit*	Bus, paratransit	2011	1,394,000	$10 million
Sonoma County Transit / *County of Sonoma*	Bus, paratransit	1958	1,361,000	$13 million
WestCAT / *Western Contra Costa Transit Authority*	Bus, paratransit	1977	1,282,000	$9 million
Capitol Corridor *Capitol Corridor Joint Powers Authority and BART*	Heavy rail	1998	1,250,000[17]	$30 million
Fairfield and Suisun Transit (FAST), Solano Express / *City of Fairfield*	Bus, paratransit	1975	1,049,000	$10 million
Altamont Commuter Express (ACE) *San Joaquin Regional Rail Commission*	Heavy rail	1998	940,000	$16 million
San Francisco Bay Ferry *Water Emergency Transportation Authority*	Ferry boat service	2007	607,000	$24 million
VINE *Napa County Transportation and Planning Agency*	Bus, paratransit	1974	550,000	$7 million
City Coach / *City of Vacaville*	Bus, paratransit	1981	508,000	$2 million
Union City Transit / *City of Union City*	Bus, paratransit	1974	505,000	$4 million
Petaluma Transit / *City of Petaluma*	Bus, paratransit	1976	318,000	$2 million
Rio Vista Delta Breeze *City of Rio Vista Transit Services*	Bus, paratransit	1978	13,000	$0.5 million
SMART / *SMART Rail*	Heavy rail	2002	Not yet in service	n/a
(future high-speed rail service) *California High-Speed Rail Authority*	Heavy rail	1996	Not yet in service	n/a

Source: Statistical Summary of Bay Area Transit Operators (July 2014), SPUR analysis. Data is for period from July 1, 2012, to June 30, 2013.

[14] Total of all adult, youth and student, senior and disabled inter-operator paid transfers and non-revenue boarding, rounded to nearest thousand.
[15] Total expenses from operations, vehicle maintenance, non-vehicle maintenance, general administration, adjustments, direct costs for providing charter services, and all vehicle lease costs. Excludes depreciation and amortization expenses.
[16] Marin Transit is a Transit Agency that funds the operation of some Golden Gate Transit buses and the West Marin Stage (sic) system
[17] Ridership for entire 170-mile service, not only Bay Area segment.
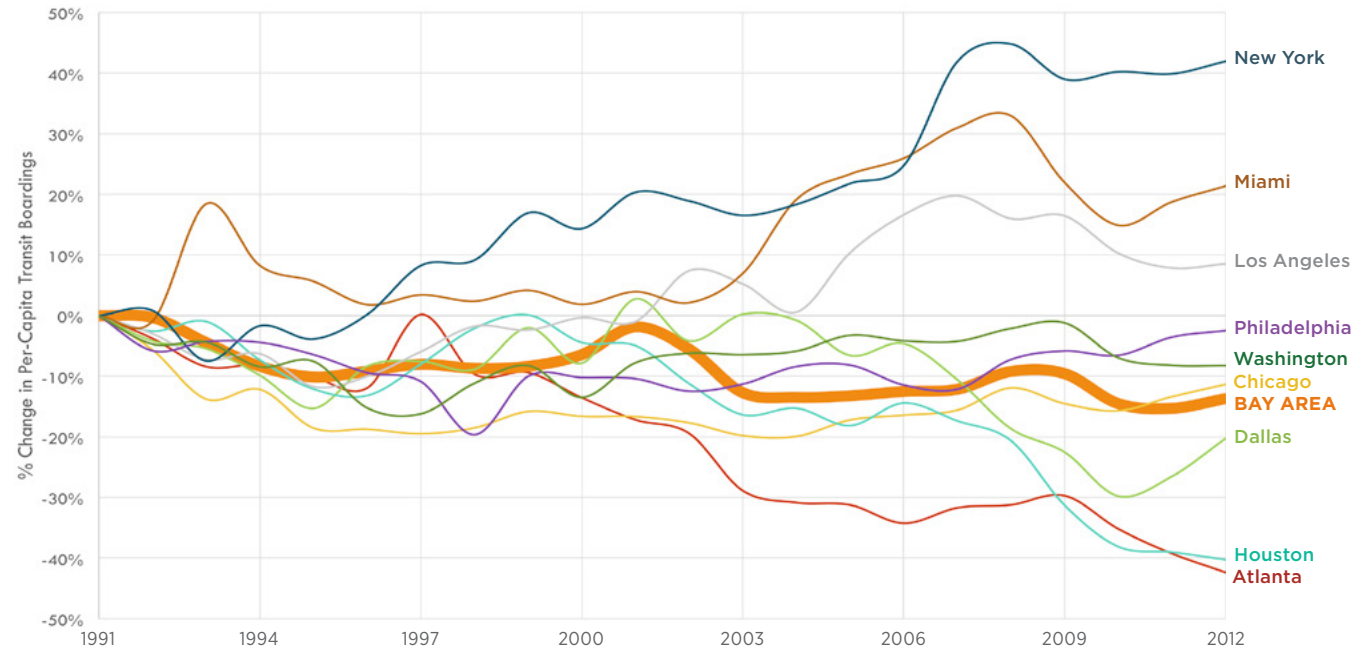
Source: Metropolitan Transportation Commission, based on Federal Transit Administration National Transit Database, 2012.

Source: Metropolitan Transportation Commission, based on Federal Transit Administration National Transit Database, 2012.

Having many operators does not have to result in a fragmented system

The institutional setup of the Bay Area's public transit is arguably the most complex in the United States. Riders navigate more than two dozen unique public transit "brands," including Muni, BART, AC Transit, the Santa Clara Valley Transportation Authority (VTA), Caltrain and many other bus, rail and ferry operators.[7] (See Figure 1 on pages 8–9.) Each transit agency operates and plans its system independently and has different funding sources.

In most major metropolitan regions, there is one dominant transit operator, such as MTA in New York City or RDT in Denver. But the largest Bay Area transit operator — the San Francisco Municipal Transportation Agency (SFMTA) — carries only 45 percent of the region's trips. In the Bay Area, using more than one of the region's transit operators for a single trip is often a necessity. But that doesn't mean it's easy; riders face barriers on trips run by multiple operators, including unfamiliar maps and timetables, multiple fares, schedules that are not

coordinated for transfers and long walks between transit connections.[8]

Not only does the Bay Area have many operators, but there are well over a hundred places across the region where two or more operators connect. These transit hubs are growing in number thanks to the addition of new transit projects. BART already serves 17 transit hubs and will serve several more with its extension into Santa Clara County. Golden Gate Transit, the bus and ferry service to and from the North Bay, serves 10.[9]

A system with multiple operators does not have to result in a fragmented transportation experience. For example, roads operated by different entities connect seamlessly for drivers. Similarly, multi-operator airline trips can be made with one ticket. There are regions in the world where many different transit operators combine
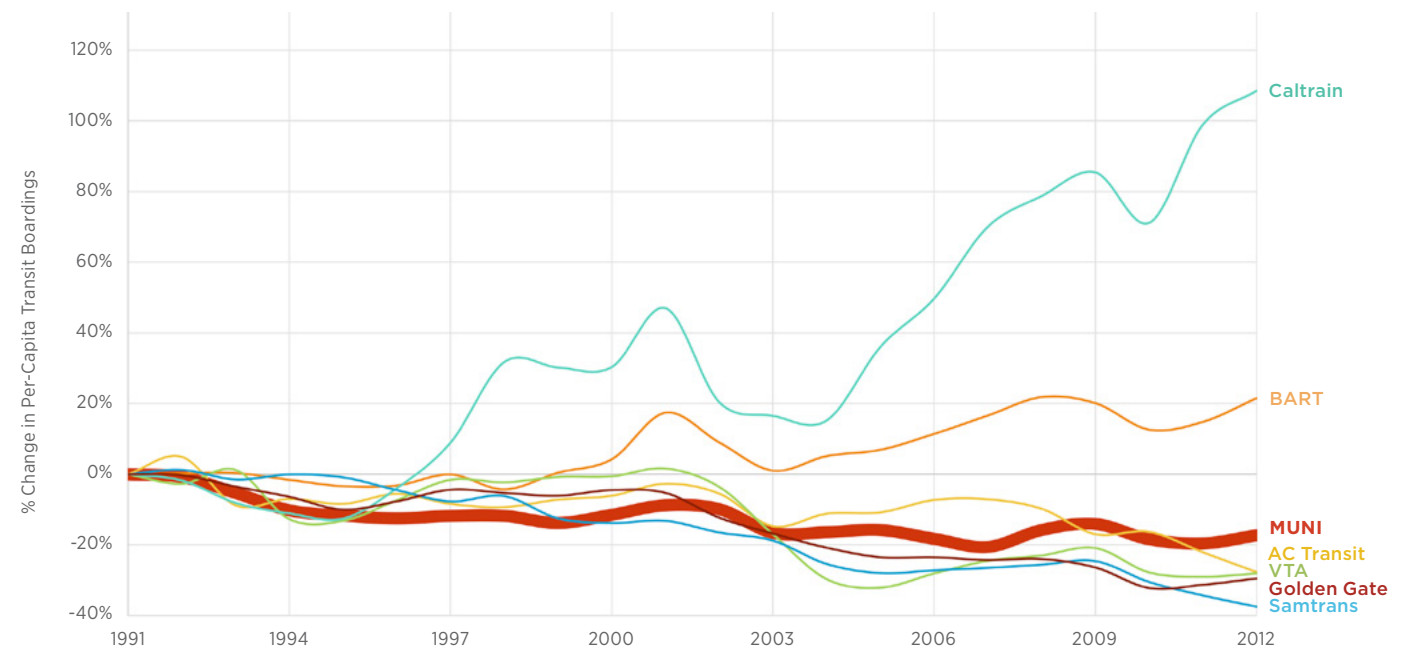
FIGURE 2

Transit Ridership Levels Across U.S. Regions

In the Bay Area, public transit per-capita ridership has declined slightly, while that of other regions has grown. The region's rate of usage has gone down from an average of 79 trips per person in 1991 to 68 trips per person in 2012, a decline of 14 percent.

FIGURE 3

Change in Daily Transit Boardings on the Bay Area's Largest Operators

While regional transit usage is surging, local transit usage is not. Job growth and the introduction of Baby Bullet Caltrain service have led to crowding during peak hours on Caltrain and BART.

their efforts to look and operate more like a single, unified network — without actually merging into one operator. Greater London (the regional area that includes the City of London) has integrated dozens of transit operators so well that the underlying complexity is completely hidden from the rider.

Not only would better transit integration improve the customer's experience, but it could also address other big transit challenges. While some transit lines in the Bay Area have capacity crunches during peak hours (such as Caltrain, BART's trains across the bay and many Muni routes), a significant amount of transit capacity goes unused, with buses or rail cars running empty (see Figure 3).[10] Local transit systems are costing more and more and producing less and less in the way of ridership. Highly successful regional services like BART and Caltrain are nearing a breaking point because we have not invested sufficiently in their upkeep. This is due in part to a lack of coordination in the region's problem-solving and in its transit investments.

It's important to note, though, that a rider can experience transit fragmentation even when using a single transit operator. Individual transportation operators can also use the recommendations in this report to improve the experience of their own multi-leg transit trips.

The region needs renewed focus on seamless transit

Although the idea of integrating Bay Area transit and creating a seamless user experience is not new, current events make the need for action more pressing:

First, the region has several new multibillion-dollar transit projects underway, and each could be more successful if it were well integrated for riders. These include VTA's BART Silicon Valley Extension to San Jose/Santa Clara, Caltrain's Downtown Extension in San Francisco and SFMTA's Central Subway. Lower-cost projects where integration also matters include bus rapid transit projects by SFMTA, VTA and AC Transit; the Sonoma-Marin Area Rail Transit (SMART); and Altamont Commuter Express and Capital Corridor intra-regional services in the East Bay.

Not only do these transit projects compete with one another for funding and ridership, but some of them are being planned without seamless connections to each other. SMART stops short of the Larkspur Ferry Terminal, the Milpitas BART

station is a half mile away from the closest VTA light rail station and the Muni T-Third line stops just short of the Bayshore Caltrain station. As a region, we have to make better connections to improve the transit network as a whole and make the most of these investments.

The state's big transportation initiatives also require integration to succeed: The majority of California's Cap-and-Trade Program[11] funding is directed to transit or transit-oriented development, and eligibility for new funding may depend on achieving a higher level of coordination. The state is also investing heavily in California High-Speed Rail, which would connect with multiple systems in the Bay Area.

Second, we need to scale existing efforts — and accomplish more integration sooner. Clipper 2.0, the process now underway to develop the next generation of the Clipper fare payment system, should include transit passes that work across the region. Ensuring better physical connections at new transit hubs around the region should also be a priority — and it's a bigger problem than any one agency or advocacy group has been able to address. The regional Hub Signage Program, which installs signs to help people navigate the region's big transit hubs, is a significant step toward a more seamless system. However, the Bay Area also needs a universal regional transit map that integrates multiple operators. At hubs like the San Francisco International Airport, we should take the opportunity to expand the transit information available, instead of showing only small parts of the regional network.

Third, fragmentation in urban transportation is growing quickly. New mass transit operators include private employer shuttles, privately run transit such as Bridj and Chariot, publicly accessible private shuttles like UC Berkeley's campus circulators and Emeryville's Emery Go-Round, and city-funded transit like the B Shuttle in Oakland. Public and private personal transportation solutions like Bay Area Bike Share and ride-hailing and ride-sharing services such as Uber and Lyft[12] are also on the rise. Many of these services are attracting the same market that public transit would, and in many cases they can serve passengers better or for less money. To be part of an integrated system, public transit offerings will need to be even more noticeable and understandable.

Finally, our region's growth plans rely on a cohesive regional transit network. Plan Bay Area, the regional transportation and land use plan first adopted in 2013, worked with local jurisdictions to identify locations for growth around transit. The plan focused 66 percent of jobs and 80 percent of housing in Priority Development Areas — places with public transit and capacity for growth.[13] To actually achieve these compact growth goals, it is necessary to have an integrated transit system that reliably serves this new growth.

Key findings on transit integration

In order to understand transit fragmentation problems and solutions, SPUR interviewed more than 100 stakeholders and experts, including transit operator staff and leadership, regional government staff and leadership, city staff, academic researchers and transportation consultants. We also reviewed case studies from across the country and around the world and looked at academic research on transit integration to understand what aspects of transit fragmentation affect transit's success. The key findings of SPUR's research are:

- Regional and state leaders have sought to integrate Bay Area transit for decades, with mixed success. In the mid-1990s, the state authorized the Metropolitan Transportation Commission (MTC) to address transit coordination. Regional Measure 2 in 2004 provided more funding and authority for coordination. The region has implemented the Clipper fare payment technology, 511 traveler information services and the regional Hub Signage Program. However, these accomplishments have required significant financial and political resources.

- Local operators have to respond to local priorities. Transit operators are often disincentivized to integrate with other operators: Integration can cost time and money, it can take away control over revenue, and it may yield little recognition for the effort. More resources and goodwill are needed to further regional integration efforts.

- SPUR found some apathy among stakeholders about facilitating multi-operator trips. State and federal transit funding programs have not emphasized integration.

- City governments in the Bay Area have had little involvement in promoting transit integration, despite the potential benefits to residents, workers and neighborhoods.

Integrating transit services can increase ridership and make the most of the region's investments in transit-oriented development, like the homes across from San Jose's Diridon Station.

Sergio Ruiz

Sergio Ruiz

Transit fragmentation can take many forms. The free B shuttle in downtown Oakland, funded and managed by the City of Oakland and operated by AC Transit, was a new transit service added to existing AC Transit and BART service.

- There is agreement that we need better governance structures to support integration, but there is little agreement on what those structures should be. Governance solutions could include a few operators working as peers, a city or mayor providing leadership or MTC having a stronger role.

- Consolidating operators could be a governance solution that reduces the need for coordination. However, mergers are difficult to accomplish and the anticipated benefits may not necessarily be realized.

- Effective integration efforts, such as fare passes or shared services, have taken place at the sub-regional level between two or three operators. But these are difficult to scale up to cover the whole region. Many other sub-regional integration opportunities are not being pursued due to lack of capacity or a constituency to advocate for them.

- Where transit integration has worked, both in the Bay Area and elsewhere, its success has depended on three factors: a focus on the customer experience, the development of trust between agencies, and incremental, bottom-up collaboration. It has also required agencies to articulate goals and track progress toward those goals. Traditional cost-benefit analysis has not spurred integration. Rather, it has taken leadership and vision.

- Data play a large role in integrating transit, both in providing information to riders and in furthering the business of improving transit. Private-sector solutions like Google's Transit Trip Planner are now overcoming long-standing information challenges. Making more data about our transit systems available would further improve third-party offerings and transit operators' decision-making.

SPUR's vision for integrating Bay Area transit

SPUR has identified the barriers to effective coordination and determined the strategies and actions necessary to get from where we are today to a future in which the region's many transit options function like one system. We have identified five strategies for integrating transit.

Strategy 1: Help travelers understand the value of the region's transit system and how to use it.

Strategy 2: Standardize fares and develop passes that encourage use of the region's entire transit system.

Strategy 3: Develop transit hubs that make transferring easy.

Strategy 4: Use an integrated approach to transit network design.

Strategy 5: Use institutional practices to promote integration.

If we continue with business as usual, each transit operator will plan and run services separately, with loose coordination from MTC. Each agency will persist in its attempts to solve rush-hour crowding independently or with only basic coordination across organizational lines. Incremental improvements to 511 and the Clipper card will continue, but each agency will still have different fare policies and traveler information. Each agency will set schedules in a way that meets its own mandates for efficiency, and coordinating connections with other agencies will remain difficult.

The region cannot afford to stay on this uncoordinated path. Without better integration, we will be paying for transit that goes underused, and communities won't have confidence in putting new growth near transit. We think this future is unacceptable for the Bay Area. ◌

A patchwork approach to transit creates challenges

The Bay Area's transit landscape is diverse. The many differences among the region's transit agencies help explain why it has been so difficult to overcome fragmentation and coordinate services successfully.

Differences among operators include:

- **History:** the reasons for the creation of agencies, their mission or their organizational goals may vary

- **Scale of service:** may be local, regional or inter-regional

- **Government:** board members may be elected or appointed; agencies may have different legislated authority and portfolios of responsibilities

- **Leadership:** management of different agencies may differ in their goals, values, skills and personalities

- **Funding sources:** may include local sales taxes, property taxes, fares, federal funds and tolls

- **Vehicles and infrastructure:** may include buses, trains or ferries running on highways, streets, rails or water; service may run aboveground or underground

- **Service type:** may run during peak hours, all day or at night only; may provide congestion relief for commuters or a social service for those without other transportation options

- **Labor agreements:** may be with operators, managers or contracted services

- **Land use:** may differ in density, urban design, zoning and parking

- **Transit operating environments:** may include street congestion, hills, high or low density, sharing tracks with freight or physical barriers such as the bay

- **Constituencies:** an agency may answer to riders, cities, business or institutional stakeholders, advocacy groups or transportation management associations

Fragmentation among transit services is much more pronounced in the Bay Area than in other U.S. regions that have multiple operators. As Figure 4 on page 16 shows, we are the only large region without an operator that carries more than half of the transit market — which means we don't have a "leading" operator that is well positioned to spearhead integration efforts. In 1996, the state legislature authorized MTC to serve this function (see "Regional Transit Coordination: How Far Have We Come?" on page 27). But despite MTC's legislated authority, integration efforts must contend with several strong transit agencies that serve different markets and have local, not regional, focus.

Sergio Ruiz

The 511 Hub Signage Program provides traveler information at transit hubs across the region where multiple operators meet.

Challenges riders face due to public transit fragmentation

Decades of research have shown that certain aspects of the transit experience shape transit usage and affect ridership levels. We have identified five challenges that our region needs to address in order to improve the transit experience for riders or potential riders. SPUR found that these five categories, as well as a lack of strong regional governance, are responsible for most of the problems posed by the region's transit fragmentation.

Challenge 1: Poor information about how to make a multi-operator trip

When they have better information, passengers can save time and wait less. Providing such information is far less expensive than other methods for reducing travel time, such as building new infrastructure. The dearth of information about how, when and where different operators connect might be acceptable to the frequent transit user who has mastered one particular trip, say a daily commute to work, but it

discourages new transit users.[18] The complexity of the system — the number of operators and variety of transit services — makes providing universal, up-to-date information difficult. Factors that create confusion about multi-operator trips include:

Gaps in transit information
Typically, websites or smartphone apps run by individual operators have little or no information about connecting services beyond schedule information. The available information assumes that riders are already familiar with transit brands and know how the system works. MTC's 511 service provides trip itineraries that cover multiple operators, but the complexity of the transit system means that often 511 cannot provide detailed enough information for riders to navigate all the necessary legs of the trip with confidence. Users may be unsure how reliable the services are, how difficult the transfers will be and whether or not there will be any discounts for transfers. A lack of sufficient information deters potential riders who don't want to take the risk of being stuck at a transit station without knowing what to do next.

18 See: Hiroyuki Iseki and Brian Taylor, "Style Versus Service? An Analysis of User Perceptions of Transit Stops and Stations," http://www.nctr.usf.edu/jpt/pdf/JPT13-3Iseki.pdf

FIGURE 4

Transit Fragmentation Among U.S. Regions

The Bay Area is the only major region without a dominant transit operator. It also has more major operators (those with more than 10 percent of market share) than any other large region.

Metropolitan Region	Market Share of Largest Operator	Primary Operator (More Than 50% of Market Share)	Major Operators (More Than 10% of Market share)	Minor Operators (More Than 5% of Market Share)	Number of Operators With More Than 1,000 Weekday Boardings
Boston	100%	MBTA	*none*	*none*	1
Denver	100%	RTD	*none*	*none*	1
Atlanta	100%	MARTA	*none*	*none*	1
Pittsburgh	100%	Port Authority	*none*	*none*	2
Phoenix	100%	Valley Metro	*none*	*none*	2
Baltimore	99%	MTA	*none*	*none*	2
Houston	99%	METRO	*none*	*none*	2
Minneapolis/St. Paul	95%	Metro	*none*	*none*	4
New York City	94%	NYC Transit	*none*	*none*	5
St. Louis	94%	Metro	*none*	*none*	2
Dallas/Fort Worth	93%	DART	*none*	*none*	3
Detroit	92%	Detroit DOT	*none*	*none*	3
Washington, D.C.	89%	WMATA	*none*	*none*	8
Philadelphia	85%	SEPTA	NJ Transit	*none*	4
San Diego	84%	MTS	NCTD	*none*	3
Chicago	83%	CTA	Metra	Pace	3
Los Angeles	73%	Metro	*none*	OCTA	17
Newark	73%	NJ Transit	Port Authority	*none*	2
Seattle	61%	Metro	Sound Transit, WS Ferry	Pierce Transit	7
San Francisco Bay Area	45% (SFMTA)	None	SFMTA, BART, AC Transit	VTA	10

Source: Metropolitan Transportation Commission

Private-sector solutions to the challenge of navigating multiple operators are proliferating and providing new benefits to travelers. They range from smartphone apps like Routesy or RideScout to Google's Transit Trip Planner. But these privately developed apps do not necessarily provide all the trip information that is available or that some riders might need, such as fare payment methods or actual fares.

Because low-frequency transit service is prevalent in the Bay Area, those making connections may have to wait long periods between buses or trains. It's particularly important, then, to provide schedule information that helps riders understand the transit system — as well as good wayfinding to minimize the possibility of missed connections.

Unclear wayfinding at transfer points

Across the region, navigating a transit connection from one operator to another can be difficult. Connections are often hard to find. New riders lack confidence that they will know where to find their next transit vehicle and how long it will take to get there. Often, no connection information (such as announcements about stops and transfer points) is provided in-vehicle during transit trips.

Research has shown that wayfinding difficulties can cause significant stress in travelers and discourage transit usage.[19] To combat this stress and facilitate transfers at high-priority transit

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[19] *TCRP Report 111: Elements Needed to Create High Ridership Transit Systems* (Transit Cooperative Research Program [TCRP], 2007), http://www.tcrponline.org/PDFDocuments/TCRP_RPT_111.pdf

Sergio Ruiz

Currently, each transit operator in the region uses its own transit maps, visual language and nomenclature.

hubs, MTC's Hub Signage Program has installed regional transit information systems that list real-time departures and show local connections on maps. The program has been well received by transit operators, several of whom, including Muni and BART, are using the signage standards in other parts of their system. However, the signage is still limited in quantity and availability, and it competes with information provided by the operators.

Inconsistent language and graphics

Each transit agency in the region has a unique nomenclature to describe its transit services, unique transit vehicles, unique maps and unique wayfinding signage with a distinct graphic style. For example, a "local" service in one area might only run for a few hours a day, but "local" could mean around-the-clock service in another area. These kinds of variations make it hard for passengers to understand and use unfamiliar transit services. Time invested in learning one system does not help the rider transition to using any of the region's other transit services. While this inconsistency is not unique to the Bay Area, the sheer number of operators makes trip planning more complex here. Local public shuttles and employer shuttles add to the complexity.

No universal transit map

Unlike other metro regions, such as London or New York, the Bay Area does not have one universal regional transit map that is widely known and understood. Regional transit maps were developed for the Hub Signage Program, but these are not used beyond the 24 transit hubs and three airports that participate in the program. In fact, they're not even used in the 511 Transit Trip Planner at this time.

The way each transit operator shows other operators on maps usually doesn't help riders make connections. For example, on the BART system map, Caltrain and Muni are depicted simply as gray lines, which is not enough information to facilitate a transfer. Research has shown that the way transit lines and stations are shown on maps strongly influences how travelers use the transit system; the lack of coordination on maps limits our ability to optimize how travelers use different operators.[20]

While smartphone apps are introducing more sophisticated digital transit maps, these don't correspond to what's available in stations or in print, potentially adding to the fragmented experience for transit users.

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[20] Zhan Guo, "Mind the Map! The Impact of Transit Maps on Path Choice in Public Transit," *Transportation Research Part A: Policy and Practice*, vol. 45, no. 7 (2011): 625–639.

SEAMLESS TRANSIT

How the Bay Area Developed So Many Transit Agencies

The Bay Area's transit history has been a series of piecemeal solutions to regional transportation problems. In 1912, the San Francisco Municipal Railway (Muni) became the first publicly owned local transit agency in the nation. The region's next oldest public transit operators were created to take over private streetcars or bus lines after World War II. State legislation that was passed in 1955 enabled the creation of publicly owned Special Transit Service Districts, like the Alameda-Contra Costa Transit District (AC Transit), formed in 1956.

The postwar period of transit municipalization coincided with the rise of the automobile. Civic leaders and planners dreamed up a new public rapid transit system that could counter increases in traffic on the region's growing freeway network. However, only voters in San Francisco, Alameda and Contra Costa counties chose to contribute to the program with a half-cent sales tax. In 1962, a new transit district was born: the Bay Area Rapid Transit (BART) District.

In 1971, just before BART service began, the state legislature passed a key piece of transit legislation. At that time, the federal government funded transit capital projects, but it did not fund transit operations. The Mills-Alquist-Dedde California Transportation Development Act (TDA) sought to remedy this and authorized that a quarter-cent of the existing 6-cent state sales tax be returned to counties to fund local transit operations. The bill enabled development of transit in suburban and rural counties. Cities and counties had the opportunity to buy into existing transit operations, but most chose to start their own.[21]

Several regional operators have been created to fill gaps in the regional rail and bus network. Caltrain began when the Peninsula Joint Powers Board rail service took over operation of the old Southern Pacific line from Caltrans. The Golden Gate Transit District, formed in 1928 to build the Golden Gate Bridge, was given the responsibility for regional bus and ferry transit service in 1969. Capitol Corridor and the Altamont Commuter Express provide intra-regional rail service in the East Bay. The Dumbarton Express bus is funded by bridge tolls and governed by the Dumbarton Bridge Regional Operations Consortium. Transit planning and funding has further fragmented with the growing role of congestion management agencies (CMAs).

In the Bay Area, adding a new transit service continues to mean creating a new transit operator rather than augmenting an existing one. For instance, the Sonoma-Marin Area Rapid Transit (SMART) District was established to operate a new rail line. The Bay Area is also experiencing a growing trend of city- or neighborhood-initiated public transit, such as the B Shuttle in Oakland, the Emery-Go-Round in Emeryville and the Palo Alto Shuttle Service. These local operations are motivated by a desire to achieve social, economic or sustainability outcomes beyond what existing transit services accomplish.

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[21] Brian Taylor, *Unjust Equity: An Examination of California's Transportation Development Act* (1991), https://escholarship.org/uc/item/7h13774d#page-5

Barriers to educating riders about how to make a multi-operator trip:

- Individual transit operators do not necessarily have an incentive to help riders navigate multi-operator trips; they may not receive revenue or political support for doing so.

- For the most part, individual operators create maps in-house or contract for them, and they don't coordinate with other operators or adhere to any regional standards.

- Public and private digital trip-planning tools rely on data that is not necessarily complete, up to date or accurate. Smaller operators in particular do not have dedicated resources to ensure data availability and quality.

- Wayfinding information is challenging to scale up for broader application; it has to operate on several interfaces (signs, maps, vehicles) and in multiple vehicle types (light rail, bus, ferry). It also requires providing layers of information, such as walking or biking times, nearby places of interest and various geographic scales (regional, local).

- Agencies face tradeoffs between using limited funding for providing service and using it for marketing.

- Transit audiences are diverse in terms of the languages they speak, their ages, their levels of mobility, and their familiarity with riding transit; it's difficult to find a visual and written language that everyone will understand.

- Station design that isn't intuitive increases the need for wayfinding information — and can make it harder to provide.

- Many agencies don't utilize user testing and feedback to improve traveler information products and station wayfinding.

- Transit agencies receive limited and sporadic funding and support for regional transit marketing, and operators' interest in regional transit marketing is limited.

Challenge 2: Difficult transfers between operators

The experience of transferring from one transit vehicle to another — especially knowing whether that transfer is safe and predictable or not — can have a significant impact on which mode of transportation people choose.[22] In the Bay Area, transferring from one operator to another happens in a variety of settings. Some transfers are forced by the boundaries of operator service areas — for example, the Palo Alto Transit Center was created at the border of VTA and SamTrans service areas.[23]

Transfers in the region can be physically demanding and at times impossible for riders who have limited mobility or those

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[22] Hiroyuki Iseki and Brian Taylor, "Style Versus Service? An Analysis of User Perceptions of Transit Stops and Stations," http://www.nctr.usf.edu/jpt/pdf/JPT13-3Iseki.pdf

[23] Transit operator service boundaries are typically dictated by state law or by an agreement between operators. Where operators cross county lines, such as Golden Gate Transit service to San Francisco, it is because of an operating agreement that permits agreed-upon stops to drop off or pick up passengers.
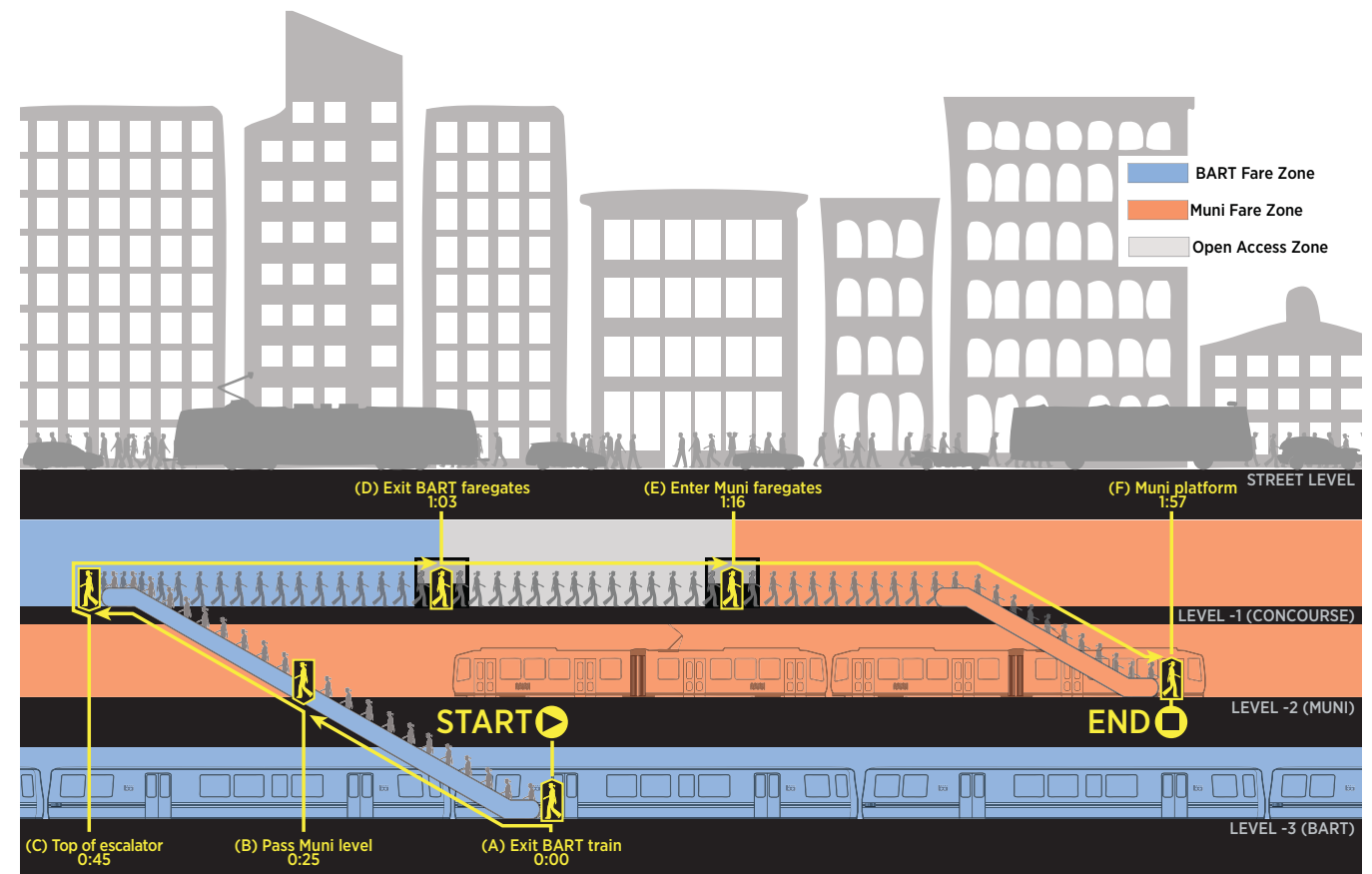
Graphic by Eric Eidlin

At Embarcadero Station in downtown San Francisco, passengers who wish to transfer between BART and Muni must first ascend to the concourse level of the station to pass through fare gates before re-descending to the other operator's platform. This transfer would take only 25 seconds if it were possible to go directly from the BART level to Muni. Instead it takes almost two minutes under ideal conditions. The transfer takes even more time during peak travel times or during special events such as baseball games, when passengers line up at the fare gates.

with a stroller or other equipment. There may be a physical barrier (like a wide or high-speed roadway) or missing infrastructure (such as a sidewalk, crosswalk or overpass). Many transfers between operators require riders to change levels (e.g., from underground to street level), and elevators and escalators are not always available for those who need them. Pathways or waiting areas at transfer hubs can feel unsafe or uncomfortable, with poor lighting, limited seating or exposure to the elements.

Transferring between buses or from rail to bus can be particularly challenging because it requires more complicated navigation, often at a large bus terminal, where waiting in the wrong location can lead to missing a connection. These hubs are often located outside neighborhood centers, making it difficult to find help or get information.

Transferring from one rail service to another can also prove difficult. The connection between BART and Caltrain at Millbrae is a vivid example: Riders must pass through fare gates, go up a level and then down a level, and wait on an exposed platform. Ideally, this would be a simple cross-platform transfer like those between trains at some BART stations. Figure 5 on page 20 highlights some rail hubs where connections were not designed to be easy and seamless.

Several major transit hubs are currently being improved or developed, particularly along BART, Caltrain, ACE and Capitol Corridor rail systems. Each one of these projects gives us a chance to incentivize riders to transfer between operators by making connections easier and more accessible to use. (See the "Hot spots for transit integration" section on page 31.)

Barriers to making transfers between operators easy:

- Improving even a small transit hub, such as a bus stop, often requires the support of the local land use authority. Designing larger transit hubs requires collaboration among multiple transit operators, the land owner, the land use authority, other services such as parking or bike sharing, and any private transit operators using the space.

- Many cities, especially smaller ones, do not have staff designated to work on multi-modal, multi-jurisdictional transportation projects like transit hubs. Cities may make transit hub design or operational decisions based on goals that have nothing to do with increasing the use of transit (for example, they may prioritize the flow of nearby car traffic).

- Transit hubs have to work with existing infrastructure, which may impose design limitations if existing buildings have been designated as historic structures or have been configured to comply with the Americans With Disabilities Act.

- Transit operators do not have the same systems to validate fares: BART uses fare gates to restrict entry, while other systems use "proof of payment," meaning riders are randomly checked after they board. Each of these systems creates transit hub design constraints.

- There is limited or only sporadic funding available to improve transit hubs. Often, funding for design is inadequate.

- Different operators receive funding from separate sources, which leads to separate planning.

- In many cases, an absence of clearly stated goals and performance monitoring —coupled with limited user research, user engagement, prototyping and testing — makes it hard to identify which changes will benefit riders.

Challenge 3: Financial penalties for riders using more than one operator

The introduction of the Clipper card has reduced much of the inconvenience of paying for fares when transferring between operators. The card has masked the complexities of the Bay Area's many transit fare policies, prices and products (i.e., transit passes, electronic fares, transfers and other mechanisms that authorize one or more rides). However, Clipper has not created a unified regional transit product that makes it easy or rewarding for passengers to take multi-operator trips.

The region has a significant opportunity to rationalize the fare structures and products that riders use to pay for transit trips: The design of the next version of Clipper is underway, and fare policies can be addressed during this process. We discuss this opportunity in depth in Challenge 4 on page 23.

Evidence indicates that strategic changes in fare structure and methods of payment can boost ridership. From 1995 to 1999, trips on New York City's buses and subway system grew by 20.4 percent, largely thanks to the launch of the MetroCard, which integrated payment systems for the two modes, and to changes in fare policies across operators.[24] Haifa, Israel, saw a similar increase when it restructured and simplified fares in 2008.[25]

Fare integration in the Bay Area has often been synonymous with a discount on transfers between willing operators. While integration efforts such as those in New York and Haifa may have resulted in discounts to riders, the primary purpose of the integration was to simplify and streamline the act of transferring to make the experience more convenient.

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[24] Brian Taylor and Peter Haas, *Increasing Transit Ridership: Lessons From the Most Successful Transit Systems in the 1990s* (Mineta Transportation Institute, June 2002).
[25] Nir Sharaby and Yoram Shiftan, "The Impact of Fare Integration on Travel Behavior and Transit Ridership," *Transport Policy* 21 (2012): 63–70.

Prices are inconsistent and penalize riders

In the Bay Area, operator fare structures fall into two basic categories: 1) local services (such as Muni, AC Transit or SamTrans), which typically have flat fares, and 2) long-haul services (such as BART, Caltrain or Golden Gate Transit), which charge distance-based or zonal fares. Each of these pricing schemes may be appropriate on its own. But when combined, they can disincentivize multi-operator trips by disproportionately increasing the cost of a trip, even with transfer discounts.

Some regional transit trips require one regional operator and at least one local operator. The distance of the local leg may be negligible or much shorter than the regional leg, but transit riders still pay nearly the full fare on the local operator to travel the last mile. For instance, a rider who wants to go from Piedmont Avenue in Oakland to Van Ness Avenue in San Francisco would pay $2 with Clipper on a local bus to go 1 mile to MacArthur BART and then pay $3.50 in BART fare to arrive at Civic Center (9.8 miles by car). At that point, he could decide to walk 10 to 15 minutes or pay $1.75 on Muni ($0.50 transfer discount) to cover the half mile to his destination. The total cost for all three legs is $7.25. On his first local leg and optional third leg, the rider has to pay a disproportionate cost per mile traveled.

Rider discount categories and their definitions also vary from operator to operator. For example, on BART the "youth" category includes anyone 12 or younger, while on Caltrain a youth is a rider up to age 18. Thus, a 16-year-old Caltrain rider who transfers to BART at Millbrae must pay the adult fare on BART. These policy differences can have significant impacts of the cost of the trip — and on the likelihood that a youth will take a trip by transit. The Caltrain discount ticket (available to seniors, people with disabilities, youth and Medicare cardholders) is 50 percent of the standard fare. The BART discount reduces the standard fare by 62.5 percent.[27]

Fare products establish loyalty to operators, not to a regional transit system

Operators benefit when riders buy monthly passes because a rider pays for the entire month's transit service up front. (Not all operators offer a monthly pass product. For instance, BART offers a loyalty discount with its high-value BART tickets.) However, from a regional perspective, monthly passes lock riders into a single operator instead of providing equal access to the entire regional transit system.

Take the example of a commuter going from Oakland to San Francisco. Most days, she uses BART, so she buys a high-value ticket (which offers a $4 discount). However, if one day she decides to take a transbay bus via AC Transit, her BART fare won't apply. She will need to pay in cash or use e-cash on her Clipper card, and she won't get the loyalty discount she'd receive by using BART.

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[27] As part of the Clipper 2.0 process, transit agencies are working with MTC to update their fare policies to standardize some of these definitions.

FIGURE 5

Missed Connections

At several rail transit hubs in the region, riders experience a difficult transfer because the facility was designed incrementally to accommodate individual transit operators' needs over time.

Transit Hub	Operators	Year of Construction	Connection Difficulty
Downtown San Francisco	BART; Muni	Early 1970s	At these stations, transferring between operators requires three level changes because riders must ascend to the mezzanine level in order to exit the fare gates of one operator and enter the fare gates of the other.
Millbrae	BART; Caltrain; SamTrans	2003	In the northbound direction, patrons who need to access a Clipper reader in order to transfer must follow a circuitous route along transit platforms. This extra time can result in platform congestion and, in some cases, missed connections. In the southbound direction, transferring requires ascending a large staircase to clear tracks, then re-descending to an exposed platform.
Montague/ Milpitas	VTA light rail; VTA BART[26]	2017	Riders will have to travel between platforms that are 500 to 600 feet apart, perpendicular to each other and on separate levels. VTA light rail will be approximately 40 to 50 feet above grade, while the BART station will be just below grade.
Larkspur	Golden Gate Transit ferry; SMART rail	Future	In order to preserve parking at the Golden Gate Transit ferry terminal, there will be a 0.6-mile walk across a high-speed arterial road to reach the SMART station, eventually via an aboveground pedestrian walkway. A more integrated system would place the SMART station at the ferry terminal.

Source: SPUR analysis.

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[26] While the Milpitas BART station is being built by VTA, it is being built to BART standards and specifications, which affects the transfer experience for riders.

FIGURE 6

Fare Structures and Products Differ Across Operators

Agency	AC Transit	BART	Caltrain	Golden Gate Transit	SFMTA	SamTrans	VTA
Fare Strategy	Flat fare with regional surcharge	Distance-based	Zone-based	Zone-based	Flat fare	Flat fare with express surcharge	Flat fare with express surcharge
Regular Adult Single Trip	$2.10 (cash) $2 (Clipper) $4.20 (Transbay)	$1.85 – $11.25	$3.25 – $13.25 (cash) $2.75 – $12.75 (Clipper)	$2 – $11.75 (cash) $1.80 – $9.40 (Clipper)	$2.25 (bus and rail) $6 (cable car)	$2 (local) $4 – $5 (express)	$2 (local) $4 (express)
Single Day	$5 day pass	*none*	$6.50 day pass (1 zone)	*none*	*none*	$5 local day pass	$4 8-hour light rail pass $6 local $12 express day pass
Loyalty Products	$75 local $151.20 transbay 31-day passes	High-value ticket provides 6.25% bonus for $45 and $60 purchases	$20.25 8-ride ticket (1 zone) $73.00 monthly pass (1 zone)	*none*	$68 Muni-only monthly pass $80 Muni & SF BART monthly pass	$64 (local) $96 – $165 express monthly pass	$70 local $140 express monthly pass; annual passes are also available

Source: SPUR analysis.

While the Clipper fare card makes it easier to use multiple operators, it does not work on all operators in the region, and it has not integrated fares among operators.

Clipper currently does not offer regional fare products that encourage riders to make use of multiple operators. According to SPUR interviews, MTC officials agreed that transit operators would not need to change fare policies or products when MTC launched TransLink, the predecessor to Clipper. Thus, instead of collaborating on fare products that would help riders access all available transit options, transit agencies merely replicated existing fare products in digital form on Clipper.

Unfortunately, the emphasis on operator-specific loyalty is difficult to address without incentives or mandates to change the status quo. For example, representatives from transit operators are currently exploring approaches to standardizing fare policies among agencies as part of the preparation for Clipper 2.0; one proposal is to replace monthly passes with cash accumulators (see "Three Models for Regional Fares" on page 41). While the accumulator would make an attempt at standardization, it would fail to deprioritize loyalty to an individual agency and to replace it with loyalty to a regional, integrated transit system.

In 2008, the region undertook a study to develop a regional transit pass.[28] However, due to operators' mutual agreement to avoid any products that would impact revenue neutrality[29] to any individual operator, the study could not recommend a regional product.

Conversations about fare integration have typically focused on operator revenues; we agree it is in the best interest of each operator to ensure that it earns enough fare revenue to pay for operations. However, SPUR has found that the goal of achieving revenue neutrality for each operator dismisses the potential to increase ridership — and thus to increase revenue for the regional system, which could then be distributed among operators through revenue sharing.

Barriers to eliminating financial penalties when using more than one operator:[30]

- Operators face different costs to provide service and rely on farebox revenue to cover those costs to varying degrees.

- Operators may be reluctant to risk any losses to farebox revenue that may result from changes to fares and fare products. Operators may lack financial incentives to coordinate fares among agencies.

- Existing operator fare policies were established for many different reasons, some political and some financial. Operators may be reluctant to change fares because it would require resource-intensive or bureaucratic processes.

- There is no central authority to oversee and coordinate regional fares on an ongoing basis. There is often a lack of trust among operators and between MTC and operators.

- Resources are needed to negotiate fare agreements among agencies and MTC.

- Operators have been concerned about the high cost to experiment with policy changes or to implement short-term discounts using the current Clipper software.

- Varied definitions of senior, youth and disabled discount policies across operators have made it more difficult to develop shared fare products.

Challenge 4: Limitations of the fare payment technology

Launching the Clipper fare payment card in 2010 was the region's most significant step toward making the transit network function as a unified system from the perspective of the rider. Clipper allows riders to pay for transit using a reloadable card that is accepted by many operators. Because Clipper loads both operator-specific fare products and e-cash, transit riders can often navigate multiple systems with only one card. According to a 2012 customer satisfaction survey conducted by MTC, 88 percent of Clipper card holders were satisfied or very satisfied with the Clipper program.[31]

While Clipper does represent a significant advance in transit coordination, the card has many constraints that impact riders and potential riders. To address these limitations in the next-generation Clipper technology, representatives from MTC and regional transit operators have launched the Clipper 2.0 process.[32] In order to provide a seamless user experience, that process should address the following challenges, which we have compiled based on stakeholder and expert interviews.[33]

Legacy technology that impacts riders

The current Clipper technology uses a card-based system[34] to store fare payment information, such as how much e-cash a rider has or whether he has activated his monthly Caltrain pass. All the business rules that run the Clipper system are also stored in the smart cards and in Clipper readers. The Clipper readers on buses and trains, the Clipper website, its call center, and other retail and customer service outlets update a system action list once or twice daily, which in turn updates riders' cards. Because of this workflow, when a rider makes a change to his account, such as the purchase of a new Muni Plus BART Fast Pass,[35] the system often does not recognize that change for one to three days. This means that an app on a smartphone could theoretically be designed to update the card, but it could not serve in place of a card or a cash fare.

First designed in the late 1990s and early 2000s, the Clipper system cannot easily support many of the technology advances that riders have come to expect, such as mobile ticketing or the ability to add value to a card in real time. To compensate for this, many individual operators have begun exploring new digital fare media on their own, such as the mobile ticketing used by VTA for special events at Levi's Stadium in Santa Clara or Muni's mobile payment app (anticipated in summer 2015).[36] However, the effect of such operator-specific mobile apps devalues the unifying influence of Clipper; some interviewees referred to such apps as a return to operator-specific paper passes.

According to SPUR interviews, Clipper's technology also makes new fare products and policy changes very time-consuming and expensive to test. Operators are therefore discouraged from making changes to their fare products or instituting short-term discount policies, such as a discount on fares to Levi Stadium for a football game or concert.

While there are advantages to a card-based system (for instance, this system does not require constant wireless communication to operate), its downsides have become more pronounced as consumer payment technology has evolved — especially in the tech-centric Bay Area.

Limited availability of Clipper cards is also a barrier. For an electronic fare payment system that's entirely dependent on a smart card, there are relatively few places in the transit network where riders can purchase the card itself. For instance, the nearest retail outlet where a rider at the Daly City BART station can buy a Clipper card is a half mile away.[37]

28 Booz Allen Hamilton and Matt & Associates, *Performance Audit: System Maintenance Review* (Metropolitan Transit Authority of Harris County, March 1, 2009), http://www.ridemetro.org/FinancialAuditInformation/Pdfs/2013/FY05-08 Per Audit/03-Task3.pdf

29 What does revenue neutrality for individual operators mean? Take this simplified example: Let's say the Bay Area's transit system consisted of two operators (A and B), which earn a cumulative $100,000 in fare revenue per year. Operator A earns $60,000 and Operator B earns $40,000 per year from fares. The two operators choose to study a regional pass product, which would likely shift the distribution of revenues so that Operator B would earn $50,000 per year from fares, but because it would result in a decrease in revenue to Operator A, the product would not be considered "revenue neutral" to each individual operator in the region.

30 Leshner and Barz, "Trouble at the Fare Gates: Understanding Barriers to Providing Seamless Regional Fare Payment in the San Francisco Bay Area," Conference Proceedings of the 94th Annual Meeting of the Transportation Research Board (January 2015).

31 MTC, "Memorandum: Clipper Customer Service," May 3, 2013, http://apps.mtc.ca.gov/meeting_packet_documents/agenda_2049/5_clipper_customer_service.pdf

32 In 2019, MTC's contract with Cubic, the Clipper technology provider, will expire. In advance of the end of this first version of Clipper, MTC and representatives from the largest seven transit operators have launched Clipper 2.0, an effort to determine what to ask for in the next fare payment system. The Clipper 2.0 team is reexamining the technology specifications, business rules, fare policies and customer service needs of a regionwide smart card program to improve operations and decrease costs.

33 There are three Clipper 2.0 committees: executive, steering and long-range. The work of these committees will directly shape the procurement of the region's next fare payment technology. Many of the issues highlighted by SPUR are being discussed in the Clipper 2.0 process. See: "Clipper® Next Generation Fare Collection Update," presentation to the SFMTA Board (June 24, 2014), http://www.sfmta.com/sites/default/files/agendaitems/6-24-14%20Item%2013%20Clipper%20Update.pdf

34 For a thorough description of card-based technology, see: Booz Allen Hamilton, "Account-Based Systems: A Road to Open Payments," 2011 APTA Fare Collection Workshop (May 29, 2011), http://www.apta.com/mc/fctt/previous/2011fare/program/Presentations/Account%20Based%20Systems_A%20road%20to%20open%20Payments.pdf

35 The SFist, "A Word About Clipper Cards," August 2, 2010, http://sfist.com/2010/08/02/a_word_about_the_clipper_cards_and.php

36 The SFist, "Muni to Debut Mobile App Payment System This Summer," January 5, 2015, http://sfist.com/2015/01/05/muni_to_debut_mobile_app_payments_t.php

37 Riders can add cash value to Clipper cards with all BART add value machines, but they cannot purchase new Clipper cards at most BART stations. Clipper cards are also available in a limited number of ticket vending machines at transit hubs, such as the SFMTA ticket vending machines located in the Muni Metro stations in downtown San Francisco and at the Golden Gate Ferry terminals. Riders can purchase the Clipper cards at customer service centers, and many other participating retailers Clipper cards are also available to order online and by phone. See www.clippercard.com for the full list of outlets.

Incompatibility with institutional agreements

Many large institutions have negotiated fare agreements with transit agencies that aren't supported by the Clipper technology. For instance, UC Berkeley and AC Transit have a long-standing agreement that provides students with low-cost semester-long transit passes, but this fare agreement still relies on students to flash their student IDs with an appropriate sticker when entering a bus. In other parts of the country, regional smart cards can carry student passes; these include the Ventra U-Pass in Chicago.[38]

Other institutions, such as large employers, often struggle to provide regionally appropriate and easy-to-use transit discounts to employees using the Clipper system. Some employers provide agency-specific transit passes, such as the Eco Pass, which VTA offers to employers at a bulk discount. However, in Santa Clara County 100,000 commuters come from outside the county every day.[39] For those commuters, a multi-county transit pass might be far more helpful.

Finally, Clipper can't redeem paper Commuter Checks via vending machines,[40] and confusion remains regarding the use of the Commuter Checks' debit cards and direct payment options available via Clipper. Such nuances make it more difficult for customers, particularly institutional customers who want to provide transit access to hundreds or thousands of people.

Clipper governance challenges

According to SPUR interviews, institutional challenges regarding the governance of the Clipper card have put up a significant barrier to the widespread adoption of the card by operators and riders. Since the beginning of Clipper (then TransLink) in the early 2000s, MTC and some of the larger transit operators have struggled to agree on which entity should own and operate the system. MTC currently owns the system, collecting and disbursing fares paid for with Clipper cards. MTC also owns the contract with the fare payment technology provider, Cubic, and transit operators have expressed frustration about the lack of opportunity to negotiate with the provider, as well as about the extra fees and lengthy wait times to make changes to fare policy.

Barriers to providing fare technology that offers a seamless user experience:

- The current contractual agreement between MTC and Cubic has resulted in fees and delays to operators when they make changes to Clipper fare pricing.

- The high number of business rules (approximately 25,000) required to run Clipper provides a disincentive to testing new discounts or fare policies.

- The Clipper software does not support institutional fare arrangements with entities other than transit agencies, such as universities.

- The fare payment technology and communications network result in delays in payment processing.

- Clipper is a closed-payments system and does not support transactions for purchases other than transit e-cash or fare products, such as car sharing.

Challenge 5: Gaps in the region's transit network and duplicative services

Riders face service gaps in the transit system, whether it's a long wait at a transfer station or the absence of transit between key origins and destinations. At the same time, some transit agencies duplicate each other's services in certain corridors. Factors that create gaps and duplication in service include:

Transit planning in silos

When solving an immediate transit service problem, and also when considering long-range network expansions, a transit operator (or in some cases, a local jurisdiction) typically develops its own plans for system expansion, choosing the preferred mode for the job: BART rail, standard commuter rail, light rail, bus rapid transit or traditional bus. This often results in adding new transit where transit service already exists. For example, VTA is currently planning a costly BART transit link between San Jose's Diridon Station and Santa Clara that mirrors existing Caltrain service. Under the current way of doing business, these two services would then compete for riders — and for funding for maintenance and operations.

On the other hand, some regional routes or corridors where there is demonstrated demand for transit can go unaddressed for years or decades. Some of the employer shuttle bus services that connect San Francisco or the East Bay to Silicon Valley job sites have arisen to meet a demand for bus service that the public system has not been able to provide. (In very suburban areas, these are not necessarily efficient routes for public transit to serve.) Similarly, some locations fall in the gaps between different operators and don't get served well. For example, Stanford University is on the edge of both VTA and SamTrans service territories and has limited public transit service for its tens of thousands of daytime trips.

There are many instances where cities and public or private institutions arrange for specific transit services to fill gaps. An example of this is the Dumbarton Express service, which is provided by a consortium of five transit operators (AC Transit, SamTrans, Union City Transit, VTA and BART) and is administered by AC Transit. However, these arrangements are one-off and do not necessarily evolve to serve changing markets.

The lack of a holistic approach results in inefficiencies and an inability to solve transit problems. In the Bay Bridge corridor, for example, BART has historically not coordinated with bus services, which could help mitigate a capacity crunch that affects the system for a few hours each day, during commute times. To

achieve optimal integration along a transportation corridor, such as the one between San Francisco and Santa Clara County, it might be best for one agency to have direct control over all of the operations in that corridor, with the ability to shift resources to respond to circumstances.

MTC's Resolution 3434 (see "Regional Transit Coordination: How Far Have We Come?" on page 27), passed in 2001, has prioritized transit expansion projects in the Bay Area and coordinated transit investments at a higher level than in many other U.S. regions. However, transit planning is a continuous activity, and new transit projects still begin locally, without a regional perspective. Figure 7 shows the wide variation in the costs of transit projects across the region.

The most recent regional transportation planning process (the Regional Transportation Plan/Plan Bay Area) did rigorously evaluate and compare the benefits of operators' proposed projects, such as the BART Silicon Valley extension to Santa Clara County or the SMART commuter rail in Sonoma and Marin counties. However, each project was not explicitly evaluated for how well it completes the regional transit network or for the quality of transfers to other transit operators.[41]

In another promising development for regional transit cooperation, five transit agencies (including the California High-Speed Rail Authority), two cities and two funding agencies have signed an agreement for the High-Speed Rail Early Investment Strategy for the Peninsula corridor.[42]

Uncoordinated connections

Even when two services connect, a long wait to transfer can add significant time to a trip. Long waits are especially onerous (and perhaps easier to fix) during off-peak travel. The extended waits often happen because operators haven't coordinated their schedules. For example, consider a commuter who takes BART to the Millbrae Caltrain station, only to discover that BART has arrived two minutes after Caltrain departed and the next train won't arrive for more than 15 minutes — wasted time that unnecessarily lengthens the commute.

Throughout the region, the prevalence of low-density areas, and related low-frequency transit services, aggravates the problem of missed connections between operators. Examples of this are the infrequent regional rail connections to VTA light rail at Diridon Station or to the VTA 181 bus service at Fremont BART. To mitigate this issue, MTC has required operators that receive certain funding streams to institute timed connections. But connecting transit services requires ongoing coordination between operators, and the implementation of timed transfers has been scattered. Some agencies have made formal arrangements regarding feeder connections, such as BART's

FIGURE 7

Costs for Current Bay Area Transit Projects

The region's large transit investments and technologies are chosen individually by transit agencies based on their own performance criteria, which may include the ability to obtain funding. Each of these projects serves a different number of new riders per dollar invested.

Project	Cost per Mile (in millions)
SFMTA Central Subway	$807
BART to San Jose Phase 2	$600
BART to San Jose Phase 1	$330
BART to Warm Springs	$180
BART to Oakland Airport	$160
VTA Vasona Light Rail Phase 2	$100
SFMTA Third Street Light Rail	$100
SFMTA Parkmerced Light Rail	$80
SFMTA Van Ness BRT (fully dedicated right-of-way)	$60
BART East Contra Costa extension (eBART)	$50
VTA Capitol Expressay Light Rail	$50
SFMTA Bayshore Light Rail	$50
SFMTA Geary BRT (majority dedicated right-of-way)	$30
VTA Stevens Creek BRT (partially dedicated right-of-way)	$20
VTA Santa Clara / Alum Rock BRT (partially dedicated right-of-way)	$20
AC Transit East Bay BRT (partially dedicated right-of-way)	$20
VTA El Camino BRT (partially dedicated right-of-way)	$10
SMART	$10
AC Transit Grand-MacArthur BRT (no dedicated right-of-way)	$ 5

Source: Analysis conducted by MTC based on Plan Bay Area cost data, 2014.

agreement to reimburse Muni and AC Transit for providing feeder services; however, these are not necessarily timed connections.

Several operators have begun more integrated service planning across their service area boundaries, which can address some of these issues. Many of these efforts resulted from recommendations MTC made in its 2010 Transit Sustainability Project. Perhaps the most promising coordinated infrastructure and service planning is the Transbay Core Capacity Transit Study, sponsored by MTC, SFMTA, the San Francisco County Transportation Authority, AC Transit, WETA and Caltrain.

In addition, the recent Solano County Coordinated Short-Range Transit Plan has begun to integrate transit service planning for five agencies in the county: Dixon Readi-Ride, Fairfield and Suisun Transit (FAST), Rio Vista Delta Breeze (RVDB), SolTrans (Solano County Transit) and Vacaville City Coach (VCC). The Alameda County Transportation Commission has undertaken a Countywide Transit Plan with its four operators (AC Transit, BART, Livermore Amador Valley Transit Authority and Union City Transit), and VTA is leading a BART Transit Integration Plan to redesign the transit network when BART service begins in Santa Clara County. In another example of service coordination and integration, BART has contracted with AC Transit to operate more transbay "all

nighter" services along BART routes during hours when BART is not operating, as part of a pilot.

Barriers to eliminating gaps in service or duplicative services:

- Operators face many institutional constraints on where service can be provided, including labor agreements, funding limitations, social and geographic equity policy goals, and control over the operating environment (e.g., streets). State laws and agreements between operators and cities place boundaries on service areas for some operators.

- Each operator determines how to prioritize its transit routes and can change them at any time without considering the effects on adjacent services.

- Agencies compete against one another for capital and operating funding at the regional, state and federal levels. This discourages cooperation.

Transferring at transit hubs in low-density areas can require long waits, due to the infrequency of suburban services and the lack of timed transfers.

Sergio Ruiz

- Our regional transportation funding process, which allocates regional, state and federal funding, tends to look at transit investments individually. Capital projects can typically be funded and constructed without an integrated transit service plan.

- It is difficult for the private sector to help support new regional transit services: Cities and private institutions cannot easily help to create new public regional bus services.

- Infrastructure can't be shared between different systems. For example, BART system technology is unique and can't be used by other rail operators in the region.

- Because each operator has its own fare products, riders face a barrier accessing all of the services that are available on a given route.

- Detailed data about the usage of current services, such as boardings or vehicle locations, is not always reliable or shared.

Regional coordination requires strong regional governance

SPUR's research found that Bay Area transit riders continue to experience transit system fragmentation because the problem is complex to solve and there has not been a strong enough system of transit governance to implement solutions to these problems at a regional scale.

MTC has made efforts to coordinate transit operators but often has stopped short of requiring operators to change their routes, operations and business rules. For example, there are still no timed transfers from BART to feeder buses, there are still no integrated fare products for adjacent operators and there is still no forum where these types of integration goals are continually pursued.

The primary reason coordination has been difficult is the sheer number and diversity of operators. Related reasons cited by experts include strained relationships between MTC and operators, as well as the power of operators — particularly large ones — to shape MTC policies and actions. Experts also blame the public's lack of engagement in solving these problems, due in part to the low rates of transit usage in much of the region. Related to all of these is the cultural tendency toward local control and decentralization in the Bay Area; each operator promotes a distinct brand particular to the places and people that it serves. (See "How the Bay Area Developed So Many Transit Agencies" on page 18.)

Thus, the state's mandate to authorize MTC as the region's transit coordinator may have promoted MTC in a statutory way without giving the agency what it needs to function better — the cooperation and regional focus necessary to deliver meaningful coordination. (See "Regional Transit Coordination: How Far Have We Come?") ○

Regional Transit Coordination: How Far Have We Come?

As early as the 1970s, MTC started advocating for integration of the regional transit system. After 1977's AB 1077 made permanent the special sales tax district that primarily funds BART (and, to a lesser extent, SFMTA and AC Transit), MTC established the Transit Operator Coordinating Council to better integrate transit service among the three large operators. However, the council did not produce the intended results.[43]

The last 20 years have brought a renewed interest in integrating the region's public transit. In 1996, the state legislature made MTC the state-authorized transit coordinator in the Bay Area through SB 1474, which required MTC to adopt rules and regulations to promote the coordination of fares and schedules for all public transit systems and required every system to enter into a joint fare revenue-sharing agreement with connecting systems.[44]

This role grew significantly with Regional Measure 2 in 2004, which resulted in a Transit Connectivity Study, an Integrated Fare Study and a Regional Rail Plan. While the fare study did not lead to integrated fares, the connectivity study led to MTC's current Regional Transit Coordination Implementation Plan (Resolution 3866), adopted in 2011. This coordination plan led to enhancements to the region's 511 transportation information service and propelled the development of the Clipper card. Important transfer stations have standardized wayfinding as a result of the regional Hub Signage Program. The Regional Rail Plan[45] developed a long-range plan for rail investments to support the Bay Area's growth into a "megaregion." The plan suggested new governance structures for rail services, which have not been implemented.

MTC has begun aligning the region's investments in large transit capital projects. In 1988, Resolution 1876 reflected interagency agreement on $4.1 billion in transit projects. In 2001, Resolution 3434 established the Regional Transit Expansion Program, which identified specific bus, rail and ferry projects as regional priorities.[46] In 2012, MTC helped to broker a nine-party agreement for California High-Speed Rail to fund improvements in the Peninsula corridor.

That year, MTC completed a critical study of regional transit, the Transit Sustainability Project. The study found that, on the whole, the region's operators incur some of the highest costs per rider in the country, and most operators costs were increasing faster than the amount of service delivered. The project ultimately recommended operators work more closely and efficiently, but avoided major governance reform recommendations.

In the absence of state-led consolidation or coordination, the region's leaders have made admirable attempts to address major fragmentation issues that have been raised over the years. However, many coordination goals have yet to be achieved.

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[43] Based on interviews with MTC staff and transit operator staff who participated in the Transit Operator Coordinating Council.
[44] MTC, Interoperator Transit Coordination Implementation Plan to implement SB 1474 in 1998 (Resolution 3055). .
[45] MTC, *Regional Rail Plan Final Report* (September 2007), http://www.mtc.ca.gov/planning/rail
[46] For more information, see: www.mtc.ca.gov/planning/rtep

How and where the region can integrate public transit

SPUR envisions a future where the transit systems of the Bay Area function like one regional network. A trip from a residential neighborhood in Fremont to downtown Sunnyvale that used two or even three operators would look like a single trip on a map, with a rational fare and easy connections. The rider would know what public transit was available, what it would cost and how to use the system.

Websites, apps and maps would present a cohesive network, not just a single operator at a time. Fares purchased in one part of the region would be usable in other parts of the region. When a rider arrived at a transit hub in a new part of the region, the wayfinding and information would look familiar. The rider's burden to use transit would be much smaller than it is today.

In the future, new transit service would be directed to the routes where there was demand, even if it crossed operator service boundaries. New transit infrastructure would be designed for easy connections. Great local transit would be highly visible and leveraged as the building block of a great regional transit network.

To achieve this vision, SPUR suggests that policy-makers, advocates, transit operators, MTC and other stakeholders wholeheartedly focus on the customer experience of transit across the region. Merging or consolidating some transit operators might well be an efficient way to alleviate some of the problems that result from transit fragmentation. However, a focus on mergers can be a distraction from the many other ways we can work with the system that we have. (See "Should There Be Mergers?" on page 30.)

Transit integration: What works?

Many U.S. and international regions have created transit systems in which multiple operators function like one system; these can serve as models of success. U.S. metro regions such as Seattle, the Twin Cities and Phoenix have all integrated (but not necessarily merged) transit services. Some European regions, including Greater London, Stuttgart and Zurich, have highly legible and easy-to-use systems where service is provided by multiple operators. (See the Hannover, Germany, case study on page 33.) From these examples, SPUR found clear lessons on what it takes for integration to succeed:[47]

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47 *Getting to the Route of It: The Role of Governance in Regional Transit* (Eno Foundation, 2014), https://www.enotrans.org/wp-content/uploads/wpsc/downloadables/Transit-Governance1.pdf and Transit Cooperative Research Program, *Improving Transit Integration Among Multiple Providers, Volume II* (Transportation Research Board, 2015), http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_173v2.pdf

For integration to succeed will require focus on researching and understanding the needs of transit customers.

1. A focus on improving the customer experience

Where integration has succeeded, the customer experience has taken priority. Focusing on customers means researching and understanding their needs and pain points and finding ways to address these. It also involves trying to increase ridership significantly rather than just serving today's riders. Market studies, design research, social media, big data and crowdsourced information can all help generate insights that fuel growth. Finally, agency leadership must be willing to incur new costs for projects that improve the customer experience.

2. Leadership, trust and sustained partnership

Experience shows that collaboration among operators succeeds with an incremental approach. Staff and leaders have to build trust over time and develop a gradual track record of success. Broadening the pool of stakeholders (to city leaders, institutions, the business community, nonprofits, retailers, etc.) helps sustain efforts over the long haul and ensures that projects are not dominated by a single interest or group.

Integration efforts should be designed to develop trust among stakeholders, with inclusive and representative committees that have transparent processes. While balancing local and regional goals, projects should maintain a local identity and be subject to an appropriate degree of local control. Larger operators should lead the smaller ones and also ensure that the needs of smaller operators are met. For example, when the Puget Sound area integrated transit services using the ORCA card, the regional agency Sound Transit led the process. (See the Seattle case study on page 43.)

3. Business practices that improve collaboration and revenue generation

Integration is easier when we have business practices that support it, especially the strategic use of data and pilot projects. Data enables operators to respond better to the market and use pricing or marketing tools to maximize stakeholders' benefits from transit. While a typical cost-benefit analysis is not useful for transit integration activities, setting goals and tracking progress against those goals are.

Integration is more successful when city or community goals (such as reducing greenhouse gas emissions or improving access to jobs) are driving business decision-making. Similarly, conversations about transit integration should fit into a broader plan to integrate all forms of transportation, including taxis, bikes and shuttles.

Should There Be Mergers?

Should we simplify our public transit system by consolidating operators? Many experts believe this is the most effective way to address some of the problems outlined in this report. Merging operators might deliver the following benefits for customers:

- Uniform branding, maps, wayfinding and marketing
- Integrated fares, pricing, service planning and capital planning
- Integrated transit hub design
- Integrated vehicle procurement and maintenance, lower administrative costs
- Reduced complexity in regional coordination
- Fewer resources and time needed for coordination

There are also concerns about the possible consequences of merging, such as:

- Tension between different missions and different financial goals
- Increased or decreased ridership
- Possible loss of jobs and/or higher operating costs
- A reduction in resiliency, redundancy and innovation across the transit system
- A dilution of the specialized expertise needed for different types of transit systems (e.g., bus, BART, commuter rail)
- Governance changes such as ceding decision-making and funding to another entity and moving control of transit service further from customers, either geographically or institutionally

Opportunities for mergers

Experts named a few types of mergers that could make sense for riders — if the concerns listed above can be overcome:

- Mergers between adjacent local operators, especially in the same county, that share funding streams
- Mergers between rail operators that connect
- Mergers between operators that serve the same corridor or market

Some transit operator mergers have recently taken place or are underway. For example, the Solano Transportation Authority, or SolTrans, is a joint powers authority created in 2010 by Vallejo Transit and Benicia Breeze. SolTrans is now considering a merger with Fairfield and Suisun Transit (FAST), which is operated by the City of Fairfield. These operators serve similar customer bases and have similar fare structures. Marin Transit is an umbrella agency for four different local transit operations that share a fare structure.

Transit agencies that use contracted services rather than agency employees (such as Caltrain, which is operated by a private-sector operator) can be simpler to merge into another agency than those with government employees because they don't require the same level of assimilation of personnel or operations.

Transit agencies can also expand to operate across transportation modes and infrastructure in an area or corridor. These arrangements bear some similarities to mergers, in that one agency takes over the operation of transit, highways, bridges and/or local streets in a designated district. VTA, for example, provides transit, builds highway projects and operates highway express lanes. The Golden Gate Bridge and Transit District operates the Golden Gate Bridge, buses and a ferry system. Governing several transportation options in a corridor gives an operator multiple tools to manage demand, price travel and deploy extra capacity where needed.

Other factors for success

Consolidations are often suggested because we expect them to improve transit services. Experience shows us that many other factors drive the ability of an agency to produce the benefits we expect. For example, BART and Caltrain's ability to respond to exploding ridership growth depends on the capacity of those agencies to raise funds and build new infrastructure, which in turn depends on the political skills of the agencies' leaders and how well they work together with local civic leadership.[48]

Before merging operators, some of the many success factors to consider include:

- Composition of the governing board; the skills, interests and tenure of leaders
- Funding levels, sources of funding and the ability to raise new funds
- Ownership or control of rights of way, land use, roads, etc.
- Rules about procurement of services and products
- Quality of fleet, facilities and other assets
- The public's ability to spur agency improvement
- Relationships with stakeholders, such as municipalities, other operators and funding agencies
- Institutional practices, systems and technology
- Integration with other parts of the transportation system (bridges, highways, etc.)
- Ability to affect transportation policies, such as transportation demand management requirements, parking fees or tolls

As our recommendations demonstrate, SPUR believes we can do much more to improve the customer experience and attract riders to the system we have today without any mergers. However, we also suggest explore or incentivizing mergers that reduce the underlying complexity of the system, grow the capabilities of operators and attract new riders. See Recommendation 16.

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[48] *Getting to the Route of It: The Role of Governance in Regional Transit* (Eno Foundation, 2014), https://www.enotrans.org/publications

Does integration require more funding?

Many types of transit integration, such as timed transfers, do not necessitate new funding sources. But some integration activities do cost money — for staff, studies, negotiations, technology and new services. Ideally, these projects become self-funding: Increased farebox revenue from increased ridership pays for larger operating or administrative costs.

Before these efforts can pay for themselves, advance funding for pilot projects or specific initiatives can help encourage integration. Transit operators in the region currently operate at a loss (to differing degrees), and stakeholders believe that new funding would make trying new ways of working far more palatable.

Where funding is needed to facilitate integration, there are several existing programs or tools that may be appropriate:

- **Local taxes:** local sales taxes and designated transit districts or other special districts
- **Cap-and-Trade Program revenue:** state funding to reduce greenhouse gas emissions
- **Road pricing/user fees:** fees for using roads or parking that can be directed to reduce congestion in the same corridor
- **Fees for a service:** for example, a percentage of all Clipper transactions or road tolls
- **Public-private partnerships:** funding from institutions, employers, business districts and crowdfunding
- **Regional funds:** a new regional bridge-toll program or regional gas tax

Any new funding should be tied to performance and create financial support for effective collaboration.

Hot spots for transit integration

We currently have several key opportunities to get transit integration right. In certain transportation corridors, integration will be critical to managing job and housing growth. There are also several transit hubs where careful integration could make or break success for a transit-oriented neighborhood.

Challenges such as peak-hour crowding could be addressed more quickly by coordinating all of the transit services in a corridor.

Sergio Ruiz

Transportation corridors

Bay Bridge corridor: The corridor between San Francisco and the East Bay, which includes the Bay Bridge and BART's Transbay Tube, is currently operating at capacity during peak hours. Alleviating this crunch in the short term, as well as in the long term, requires coordination across transportation modes and operators, including BART, AC Transit (which runs the majority of transbay buses) and the San Francisco Bay Ferry, among many others. BART's transbay capacity problems could be alleviated by the use of more buses and by the new Transbay Transit Center, which will be able to accommodate 350 buses per hour when it opens — a capacity similar to a BART station's. A coordinated transit approach could also lead to an HOV or transit-only lane on approaches to the Bay Bridge and on the Bay Bridge itself. SPUR has previously recommended transit-only lanes as a solution to support downtown San Francisco's growth. A governance approach to this coordination could be to integrate AC Transit's transbay buses into BART and have BART operate the transbay service.

Peninsula corridor: Like the Bay Bridge corridor, the corridor between San Francisco and Santa Clara counties, a narrow slice of land between hills and the bay, is operating at capacity much of the day. A coordinated approach to growing capacity on the major roads (I-280, El Camino Real and Highway 101) and on transit (Caltrain, local transit, buses, future bus rapid transit and future high-speed rail) would help the region choose the best investments to support compact growth. Caltrain's ongoing funding instability (the result of its reliance on voluntary contributions from three agencies) makes it urgent to think about the future of transit service in this corridor.

The Peninsula corridor is closely tied to high-speed rail, and coordination is critical both for achieving great rail service and for seamlessly integrating high-speed rail with local transit and station areas. The California High-Speed Rail Authority is a state-run agency whose service is expected to run on the same tracks Caltrain uses today. Experts agree that, with careful management of schedules and performance and with integrated station and platform design, these tracks can carry a high capacity and accommodate different operators. Maximizing the opportunity that high-speed rail offers may require a new governance structure for this corridor.

Sonoma-Marin rail corridor: The success of the new Sonoma-Marin Area Rapid Transit (SMART) train, scheduled to begin service in 2016, depends on bringing riders to the SMART stations. There are five bus operators and one ferry operator along the SMART corridor (Golden Gate Transit, Marin Transit, Sonoma Transit, Santa Rosa City Bus and Petaluma Transit). Coordinating these services with SMART could significantly improve the rider experience and increase business for all of the operators involved. It would also allow SMART to develop pricing strategies that spur ridership and enhance operations. Providing an attractive, seamless transit network in these two counties could also help efforts to grow more compact and walkable communities.

San Jose to Tri-Valley corridor: Several connecting commuter rail services are being upgraded in the San Jose to Tri-Valley corridor: ACE, Capitol Corridor and possibly BART service (when it is extended to Livermore). If these three services connect seamlessly with one another and with local feeder services, the result could be a major transit upgrade for the East Bay and the South Bay.

Transit hubs

Transbay Transit Center: Phase I of San Francisco's Transbay Transit Center, scheduled to begin operating in 2017, is expected to accommodate 100,000 passengers each day. Many will be connecting between buses (AC Transit, Golden Gate Transit, Muni and others) and nearby Caltrain, BART and Muni Metro. The Caltrain downtown extension will arrive at the terminal in several years, and eventually California High-Speed Rail will serve the Transbay Transit Center as well. This array of transit services should benefit from as much integrated marketing, station access, wayfinding, fares and ticketing as possible.

Diridon Station: When BART Silicon Valley Phase II arrives at San Jose's Diridon Station and connects with Caltrain, ACE and Capitol Corridor, a missing link in the regional transit network will be completed. BART, Caltrain, VTA and the California High-Speed Rail Authority will have to coordinate in significant and ongoing ways to ensure that this connection attracts riders, shapes land use and supports transit-oriented neighborhoods.[49]

Brisbane Baylands: Development is moving forward for several sites on the Brisbane-San Francisco border that are adjacent to Caltrain, Muni's T-Third light rail, BART, SamTrans buses and future Geneva-Harney bus rapid transit service. Today, the transit connections are poor or nonexistent and need to be improved to fulfill the vision for a transit-oriented neighborhood, as the 2012 Bayshore Intermodal Station Access Study found.[50]

Downtown Oakland: As downtown Oakland grows, transit can play a larger role in moving people in and out of the city center — if it's legible as one network of services. BART, AC Transit, Amtrak and local shuttles serve the area today, and new investments in bus rapid transit will increase transit capacity. Interregional buses also serve the Greyhound terminal in downtown Oakland. In the future, a second BART line, Caltrain or high-speed rail could go through Oakland and through a new transbay tube. ⚙

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[49] Some experts have proposed establishing a four- or five-county BART district that would include Santa Clara and/or San Mateo counties, in addition to the three counties already on the BART board: Alameda, Contra Costa and San Francisco. Levying a 3/8-cent sales tax in the district would help maintain BART's large capital assets and allow the South Bay counties to help govern the agency, among other possible benefits.
[50] "Study Products and Schedule," *Bayshore Intermodal Station Access Study* (SFCTA, March 27, 2012), http://www.sfcta.org/bayshore-intermodal-station-access-study-study-products-and-schedule

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CASE STUDY **HANNOVER, GERMANY**

One User Experience Across Many Modes of Travel

Grossraum-Verkehr Hannover

Üstra

Transport alliances

Germany is renowned for its highly integrated transit. A defining governance feature of German public transportation systems is that service is coordinated and funded at a regional level through *Verkehrsverbünde*, or "transport alliances." Virtually all German metropolitan areas and cities are now integrated into one of the nation's 75-plus *Verkehrsverbünde*. Transport alliances were first developed in the mid-1960s in Hamburg to address the city's disorienting public transit network, redundant routes, conflicting schedules and confusing fares.[51]

The two main responsibilities of a *Verkehrsverbünd* are to: 1) develop a uniform fare structure, independent of transit providers, and 2) coordinate timetables and routes to reduce redundancy, service gaps and wait times. Additionally, the *Verkehrsverbünde* typically acts as the central administrator of fare collection and the distributor of public subsidies from local and state governments. Each *Verkehrsverbünd* plays the role of transit advocate for its region and plans for future needs. It produces a comprehensive local marketing strategy and lobbies state and federal governments for funding.

By enabling transit patrons to make a journey involving multiple providers with just one ticket, German transit providers have been able to provide a more seamless travel experience.

Universal mobility services

Many German public transportation providers have gone beyond operating transit and have ventured into providing comprehensive mobility services that include other ways to get to and from transit stations.

First pioneered in Hannover, Germany, in 2004, one-stop mobility services seek to make transit a more viable option for more people, especially those who live or work where traditional transit service is limited. Under the HANNOVERmobil program, public transit makes up the backbone of urban transportation, with support from other modes — including car sharing, bike sharing and taxis — to ensure door-to-door transportation in places where transit service is less robust.

Mobility services may include the following offerings:

- Public transit passes
- Car-share memberships and discounts
- Car rental discounts
- Discounted taxi fares; cashless payment
- Bike-share memberships
- Limited use of bike sharing for free; additional hours at discounted rates
- German Rail discount cards for intercity rail trips
- Discounted parking at park-and-ride facilities; cashless payment
- One integrated bill for all mobility services, including fees, car sharing and taxi trips

Another feature of mobility programs like HANNOVERmobil is that they make information regarding all travel options available through a single platform. Users have one smart card that allows access to multiple mobility services. Payment is also coordinated and simplified: Customers receive a comprehensive bill for all travel that they do with the card. Simplified payment reduces the difficulty of transferring between transportation modes. This makes trips that involve transfers seem more convenient — a little more like driving a car. Finally, many mobility services also apply volume discounts without the need to pre-purchase in bulk. This final feature gives riders an incentive to ride transit more, thereby encouraging transit use.

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[51] For more information on the importance of the *Verkehrsverbünde* to Germany's transit integration, see: Robert Cervero, *The Transit Metropolis: A Global Inquiry* (1998).

Recommendations

SPUR's recommendations propose overcoming the region's transit fragmentation in two ways: First, better explain transit options to users and improve the user experience; and second, simplify the transit system itself. We should emphasize improvements in the places where there is the largest market for transit and where we are building significant new transit and transit-oriented development.

This includes certain cities (San Francisco, Oakland and San Jose), operators (SFMTA, BART, AC Transit, VTA and Caltrain) and corridors (Bay Bridge and various inner East Bay and South Bay corridors). Small improvements to these key areas will benefit a disproportionate number of people. Improvements should also be made outside of these areas but will require more nuanced strategies and solutions.

STRATEGY 1
Help travelers understand the value of the region's transit system and how to use it.

Recommendation 1: Develop marketing for the regional transit system.

Who: MTC, operators

The region's transit services should be marketed as one system in order to improve the overall customer experience and help travelers make better use of the services that are available. Marketing (which includes branding, logos and communicating all types of information) can educate travelers about the value of transit and how it functions, while also facilitating deeper coordination among agencies. A high-quality regional marketing campaign can also tie together public efforts to influence transit usage, such as the Los Angeles County Metropolitan Transportation Authority (Metro) did with its "Opposites" campaign.[52] A cohesive regional marketing program should include one overarching website for regional transit information.

SPUR suggests expanding the Clipper brand or developing another brand to become the "voice" of public transit in the region. Over time, a single regional transit interface could shield customers from the complexity presented by each operator's maps, websites, customer service centers, fare

52 Michael Lejeune, "Make Metro Cool: LA's Public Transit Revolution Is Also an In-House Success Story" (American Professional Organization for Design, July 25, 2013), http://www.aiga.org/make-metro-cool

payment technologies and schedules. This unified branding can extend to transit vehicles, service names (such as "rapid" or "express"), fare products and pass programs (discussed under Strategy 2), signage, maps, timetables and mobile apps. Similar strategies can be used at a sub-regional scale to market a set of transit services.

Recommendation 2: Provide clear, consistent and ample transit information across the region.

Who: MTC, operators, cities

Travelers should be able to use the region's transit system without a smartphone. Those who are new to transit, or those who need to travel widely around the region using different operators, would particularly benefit from more consistency in visual styles, service names and symbols across operators. We also need to provide enough information to make the region's transit more visible — especially in areas where transit is infrequent and harder to understand.

As part of the Transit Coordination Implementation Plan, the existing Hub Signage Program has established standards for wayfinding, transit information displays and real-time displays and applied them in many parts of the region. While the program does not currently provide guidance for operators' own platforms, we encourage the use of the program's standards in more places. SPUR recommends evolving the Hub Signage Program to be a general transit station information program that provides technical assistance and addresses more types of transit information.

Live signage solutions, such as Transit Screen, project a list of pertinent transit options on a screen or other surface, which can be located in a transit station or somewhere in the surrounding neighborhood. These products are largely built using schedule and vehicle location data that's provided by transit agencies (and therefore they're only as accurate as the data the agencies make available). These and similar innovations could make it easier to address the paucity of information on transit options; experiments and pilots can help determine which solutions work best.

It may be easiest to expand information at stations when constructing new facilities or upgrading existing infrastructure. The current improvement of BART canopies at station portals presents an opportunity to employ Hub Signage Program best practices, especially for new live signage, to help riders understand their transit operations at the street level near BART station entrances.

Recommendation 3: Develop great regional transit maps.

Who: MTC, operators

To increase regional transit usage, MTC should spearhead the creation of a commonly used regionwide transit map. The agency should also work with operators to develop map styles and best practices that can be shared across operators. Achieving this will require both a funded regional map program and ongoing collaboration.

State or regional funding could promote the development and maintenance of great transit maps. A "frequent network" map, showing all services offered every 15 minutes or less, would be a useful place to start. If transit operators all agreed to revise their routes at roughly the same time, maps could be updated accordingly. The new Muni map, to be deployed in spring 2015, uses line thicknesses and other information to help direct riders to highly serviced routes and stops; the same kind of approach could make it easier for riders to transfer between operators, thereby optimizing the use of our existing transit system.

Graphic Design by Brenner Vasquez

A regional transit map calls for excellent design, making this an ideal opportunity to hold a design competition.[53] The advantage of not having an existing universal transit map is that we now have the chance to create something that draws on the Bay Area's best design practices.

Recommendation 4: Support third-party providers of transit information and tools.

Who: MTC, operators

In the past, the public sector has had to invest in making travel information tools such as the 511 Transit Trip Planner. Today, with transit data made available to the public, the most advanced products are being built in the private sector. Google's Transit Trip Planner (shown above) is a good example. Despite the growth in private information services, there is a continuing need for public trip-planning information that has universal access and provides information on the full extent of transportation services available. In particular, local shuttles are an increasingly important part of our transit system.

It is impossible to make a traveler information tool that will work equally well for all kinds of travelers. Some users only need local bus information, while some travel on multiple transportation modes across the region every day, and others combine transit with driving or cycling. Some travelers are constantly planning new trips in new places, and some make the same trips over and over again. To meet the most needs, the region should allow for innovation in traveler information tools, all built on high-quality data.

We recommend that MTC work with operators to help cultivate more transit data for public use and to ensure that data standards used or developed in the private sector are also usable by the public. (For example, the General Transit Feed Specification, which defines a common format for transit schedules, was developed by Google and is currently used by transit operators to share their schedule information.) Similarly, operators should focus on making data available to MTC and to third-party information providers. Recommendation 19 suggests ways agencies can improve their use of data.

Live signage solutions, such as screens or projections, can be an economical solution to help explain transit options and provide real-time information to travelers.

STRATEGY 2
Standardize fares and develop passes that encourage use of the region's entire transit system.

Recommendation 5: Develop regional, integrated fare products.

Who: MTC, operators, large institutions and employers, civic leaders and organizations

The region should follow through on its goals for standardizing fare policies and developing a truly integrated regional fare product. Stakeholders — including operators, cities, institutions and businesses, as well as MTC and other transportation agencies — should begin a facilitated process to develop such a product today. The 2008 Integrated Fare Study was a missed opportunity to create a regional transit product, but it could be righted with a renewed effort to maximize ridership levels and a willingness to use new funding to facilitate the transition to an integrated product.

Lessons from other regions show that it will be important for the big operators to lead and ensure that smaller operators also benefit from regional fare coordination. Below are four steps for developing regional fare products:

1. **Establish goals and criteria.**

   Based on the barriers that have been identified by stakeholders and the recommendations of experts in transit coordination, SPUR recommends using the following goals when developing fare products for multiple operators:

   - Maximize regionwide transit ridership.[54]
   - Reduce barriers to transit usage.
   - Eliminate the financial penalty for riders who use more than one system.
   - Let operators set prices — but establish regional guidelines for doing so.
   - Limit the downside risk to overall operator fare revenue and seek additional funds to reward coordination.[55]
   - Offer some kind of discount with complementary transportation modes such as bike sharing and car sharing. (For more on "bundling" mobility options, see the Hannover, Germany, case study on page 33.)

2. **Standardize operator policies.**

   Fare structures that are more consistent among operators would make it simpler to offer integrated fare products, and there is work left to do in this area. Fare discount categories (youth, senior, disabled, etc.) should not shift from operator to operator or city to city. Other rules, such as the duration of a fare or transfer and the cost of transfers, should be as clear and as uniform as possible. Standardizing discount policies across operators — or at least across regional operators, and then separately across local operators — would make it easier to develop regional revenue sharing among operators. According to interviews, the Clipper 2.0 effort has already taken steps in this direction.

3. **Analyze costs and benefits of different regionwide fare scenarios.**

   Several scenarios are plausible for the Bay Area (see "Three Models for Regional Fares" on page 41). SPUR recommends that the region undertake a new integrated fare analysis, which would project how ridership would respond to these different scenarios, and then adopt the structure that best meets the goals outlined above. As with all recommendations, the focus should be on those markets with the most potential to grow transit's market share.

4. **Launch regional or sub-regional products.**

   To be successful, a regional fare product should reduce the overall complexity of the system. For instance, the benefit of adopting a daily cap akin to London's (see "Three Models for Regional Fares" on page 41) would be diminished if the cap competed with a multi-trip ticket that had greater brand recognition.

   New products could be launched first in sub-markets in which riders commonly take more than one mode or operator to get around. For example, BART is a part of many multi-operator trips in the region, but it only offers a shared pass product with Muni. Products like an East Bay pass or a transbay pass would benefit large numbers of riders.

   Sub-regional fare products and products that would support transit trips to large institutional employers would be a useful step toward a regional fare product and would allow us to learn what works. The actual development of such a product may take time, negotiations and research, ideally with support from MTC as well as CMAs or cities and counties whose constituents would benefit from the product.

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[53] For example, design services for the Market Street BART/Muni station canopies in San Francisco were procured through a design competition. On-call consultants for each agency were given a stipend to compete. See: "Urban Design," Official Market Street Improvement Initiative, City and County of San Francisco (January 1, 2014), http://www.bettermarketstreetsf.org/about-urban-design.html

[54] Maximizing transit ridership means either gaining new riders or increasing the market share of trips served by transit.
[55] Preserving revenue neutrality for individual operators should not be a constraint, as it was in the 2008 Integrated Fare Study (Booz Allen Hamilton, 2008). See note 27 for an explanation of "revenue neutrality." Based on experience elsewhere, it is unlikely that total fare revenue to the entire system would be noticeably compromised because of a regional fare product.

CASE STUDY **LONDON, ENGLAND**

Giving Travelers Confidence in the System

Wayfinding incorporates all of the ways individuals orient themselves in physical space and navigate from place to place, including street signage, maps and pedestrian or transit information systems. More cities and local governments are adopting outcomes-based approaches when redesigning urban wayfinding — that is, they're crafting wayfinding strategies to achieve specific mobility or accessibility goals for travelers.

Transport for London's wayfinding program, Legible London, has become a world model for urban wayfinding.[56] The model's design addresses the various ways individuals process information when navigating through streets and transit stations.

Michael Alexander

Recent psychological research has shown that our subconscious greatly assists us in navigating through our surroundings.[57] Research also suggests that our subconscious has a significant effect on our decision-making skills. Therefore, individuals who are walking, cycling or using public transit are discouraged or puzzled by inconsistent signage and missing information about trips between areas. Keeping human cognition in mind when designing wayfinding systems ultimately incentivizes more people to walk and use public transit. Transport for London found that a multitude of pedestrian signs in central London were ineffective and often confusing; consequently, pedestrians tended to rely on the underground subway map to navigate aboveground.[58]

London once had at least 32 separate wayfinding systems for pedestrians. Today, residents and tourists use one unified, intuitive wayfinding design to answer four key questions when strolling the streets of the capital:

- Where am I?
- Where is my destination point?
- How long will the trip take?
- What else is nearby?

Transport for London found that focusing on these four simple questions permits the human mind to quickly process urban information. Earlier signage systems provided incomprehensible information that essentially clouded the brain's processing mechanisms.

After two years of implementation, Transport for London surveys found that the majority of pedestrians used Legible London, along with other visual cues like street signs, paper maps and smartphone maps. Legible London was particularly useful for providing initial orientation and instilling more confidence at the start of a journey, especially when pedestrians emerged from the subway station. Users reported a high level of trust when using the wayfinding system, and some pedestrians felt that it "shrunk" the city and made it more walkable.[59]

[56] *Legible London Yellow Book: A Prototype Wayfinding System for London* (Transport for London, January 1, 2007), http://www.tfl.gov.uk/cdn/static/cms/documents/ll-yellow-book.pdf

[57] Tim Fendley, "Making Sense of the City: A Collection of Design Principles for Urban Wayfinding," *Information Design Journal (IDJ)* 17, no. 2 (2009): 89–106.
[58] *Legible London Evaluation 2013/14 Report* (March 1, 2014), https://www.tfl.gov.uk/cdn/static/cms/documents/legible-london-evaluation-summary.pdf
[59] *Ibid*.

Recommendation 6: Develop a regional fund to facilitate new regional fare products, and adopt a revenue-sharing agreement.

Who: MTC, California State Transportation Agency

To reduce the risk from falling revenues after fare integration, funding should be set aside to compensate operators for losses and reward them for participating in a regional fare structure. Such a temporary funding arrangement helped the Seattle area shift to the ORCA system while protecting operators' bottom lines.[60] (See the Seattle case study on page 43.) Any new funding stream should be linked to operating costs and level of service as well as to key performance indicators regarding regional coordination.

More importantly, operators will need to agree on revenue sharing. Models for this exist as well. Fare revenue from a regional product could be collected in a regional fund and redistributed to operators on the basis of passenger-miles traveled or time spent on a particular operator's system. Alternatively, operators could adopt the "bounty" model,[61] in which regional operators collect revenue from riders and then pay local operators for bringing riders to the regional system. Some revenue-sharing arrangements already exist, such as the Fast Pass agreement between BART and Muni. A new fare pilot between AC Transit and BART, initiated in 2014, also requires revenue sharing.

Recommendation 7: Use a consistent fare-setting schedule that favors regional coordination.

Who: Operators

Currently, transit operators make fare changes with varying frequency and at different times of year. While operators should continue to set their own fare prices, it would benefit regional coordination if fare adjustments happened concurrently. For

Travelers using more than one transit system have to pay multiple fares. One exception is the shared pass between Muni and BART for travel within San Francisco.

[60] Transit Cooperative Research Program, *Improving Transit Integration Among Multiple Providers, Volume I* (Transportation Research Board, 2014), http://nelsonnygaard.com/wp-content/uploads/2015/01/tcrp_rpt_173v1.pdf

[61] SPUR, *A Better Future for Bay Area Transit* (March 2012), http://www.spur.org/publications/spur-report/2012-03-08/better-future-bay-area-transit

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instance, the biggest seven operators (which carry the vast majority of riders) could regularly review their fares according to a mutually agreed-upon annual or multiyear schedule. Changes to regional products, fare pricing and revenue-sharing formulas could be built into the fare adjustment schedule, which would make it easier for operators to influence regional changes based on local concerns.

Recommendation 8: Encourage variable pricing and develop a means-based fare payment program at the regional level.

Who: MTC

Pressure to keep transit fares low (i.e., to price transit as a social service) can compromise an operator's efforts to provide reliable and frequent transit service. Developing an income-based fare discount category would relieve some of this pressure, as long as operators could also establish differentiated pricing on longer and more expensive trips in order to recoup costs. For example, long-distance operators could optimize fares to shift demand from peak to off-peak service while offering discounts to riders who need them the most. Such schemes could also better balance demand and reduce overcrowding without requiring a significant increase in capacity.

While transit providers commonly offer discounts for youth, senior and disabled transit riders, there are no consistent means-based discount opportunities for low-income transit riders. SPUR recommends that the region define a means-based discount category for low-income individuals, because that category is critically important to the regional economy.[62]

Recommendation 9: Ensure that regional transit fare payment is convenient and reliable.

Who: MTC, operators, Bay Area Bike Share, Bay Area Toll Authority, California State Transportation Authority

MTC is current developing requirements for the next generation of Clipper, which will likely involve the procurement of a new technology platform. SPUR applauds the collaborative Clipper 2.0 process and encourages MTC to work with operators and to seek input from riders and potential riders about what kinds of technologies would best support their needs.

According to SPUR's research, the next generation of Clipper should support:

- **An account-based system.** As opposed to the current card-based technology that powers Clipper, an account-based system stores the fare payment and value information in a user's account in a back-office database.[63] For instance, one rider could have both a smart card and a mobile app

associated with the same account. In the event that he loses his smart card, he could just as easily use his smartphone to pay a transit fare or add value to his account. Family transit accounts would also be possible. In account-based systems, devices like smart-card readers don't store all the system's business rules and fare policies, which makes system updates much faster. Moreover, fare policy changes are easier to test and implement, which can make short-term discounts practical for operators.

- **Different types of fare payment media.** This could include existing Clipper cards, mobile ticketing, digital wallets and, in the future, wearables or other mobile devices. The region should aim to capture riders who are unable or unwilling to take any special steps to pay for transit, and it should work to reduce the use of cash fares, which cause significant inefficiencies. Accepting common payment media, such as credit cards and cell phones, for transit fare payment would reduce a barrier to transit ridership. Furthermore, the use of those technologies could save the region money; relying on a single smart card, as we do now, requires expensive vending machines and related technology.

- **Operator experimentation with fare policies.** One of the main lessons learned from the initial Clipper contract was that operators need flexibility in fare setting. Transit agencies want the freedom to make fare changes and to experiment with products without financial penalty. They also must be able to support institutional fare agreements with non-transit entities like universities and major employers.

- **Ridership incentives and loyalty programs.** The region's transit system can take a lesson from the national airlines and Amtrak by investing in a third-party technology that allows for incentives and loyalty programs, such as frequent-rider miles or rewards points based on trips taken or on a monthly or annual basis. Incentives can help change behavior — for example, by encouraging riders to travel at off-peak hours.

- **Integration with other transportation costs.** With the growth of pricing on highways and the prospect of a high-speed rail network in California, the next generation of Clipper may offer the Bay Area the opportunity to lead the state in integrated mobility pricing. Payment for bike sharing, bike lockers, parking and FasTrak could be integrated.

- **Open and available travel data.** In the era of big data, the region stands to leverage considerable free and low-price software development and transit rider data analysis, provided that a technology platform exists to support it. We recommend standardized interfaces that maximize the potential for data analysis and privacy policies that allow for the safe use of the travel data collected. Open-source software components are highly encouraged.

62 SPUR, *Economic Prosperity Strategy* (October 2014), http://www.spur.org/publications/spur-report/2014-10-01/economic-prosperity-strategy
63 Booz Allen Hamilton, "Account-Based Systems: A Road to Open Payments," 2011 APTA Fare Collection Workshop (May 29, 2011), http://www.apta.com/mc/fctt/previous/2011fare/program/Presentations/Account%20Based%20Systems_A%20road%20to%20open%20Payments.pdf

Three Models for Regional Fares

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There are a variety of fare structures that a region can adopt to standardize pricing across operators. For instance, Transport for London uses a zonal fare structure where prices vary based on two factors: time of day and the extent of travel across nine zones. The lowest off-peak, single-trip fare is £1.50, while the highest peak, single-trip fare is £8.90. Riders can use an Oyster card, which will calculate charges for them; those who "tap" in and out with the card are not charged for transit trips after they reach a daily cap. London also offers discount passes for a week, a month or longer.[64] Zurich and Paris have zonal fare structures as well. These regions offer a variety of passes that most operators accept and that meet the needs of travelers, occasional transit users and regular commuters.

Portland, Oregon, sought to sidestep the issue of hybrid fare structures by introducing daily and monthly fare capping in its new electronic fare system, currently under development. Even though the fare structures between transit agencies TriMet and C-TRAN are not identical, both systems will be subject to the same caps. This new system will effectively allow riders to buy a monthly pass good for all Portland operators, one ride at a time.[65]

Unlike Zurich and London's systems, which have regional transit coordinators that manage many transit operators using one zonal fare structure, no entity in the Bay Area has imposed a regional fare structure. Transfer discounts offered between

systems do not adhere to any regional guidelines. Any fare agreements that waive transfer costs for riders, such as the Muni Plus BART Fast Pass, are negotiated on an ad hoc basis between operators.

Yet regional fare coordination can occur without shifting to a regional zonal system. In Seattle, the region's transit operators worked together for 12 years to develop a regional pass that largely leaves intact the hybrid collection of zonal, flat and distance-based fares that individual operators devised. (See the Seattle case study on page 43.)

The following models of fare structures and products could apply in the Bay Area:

Regional and sub-regional passes
The Bay Area could introduce regional passes based on distance traveled or on the lowest fare combination available on a common route. Such passes need not require changes to the hybrid fare structure model that currently exists in the Bay Area. A basic example of this is L.A. Metro's Silver Line and Foothill Transit's Silver Streak: Riders can use the same ticket and pay the same fare for travel between the El Monte Station and Los Angeles, regardless of which transit provider they use. Thus, riders benefit from increased service; they can just board the first bus that arrives.

Local pass with access to regional operators
Another model would allow riders to purchase a pass from a local operator that offered travel on regional providers within the local operator's service area. For instance, Muni has a long-standing agreement to reimburse BART for rides that Muni Plus BART Fast Pass holders take on BART within the Muni service area. If all local operators provided this pass option and honored reciprocity with other local passes, riders would not have to pay a disproportionate cost per mile on the last leg of a multi-operator trip.

Regional accumulator
Unlike the two pass models discussed above, the accumulator (or cap) model rewards frequent riders without requiring them to buy a pass from one particular operator or for one geographic area. Riders pay for each trip taken on any operator up to a daily, weekly or monthly limit that's established regionally or sub-regionally. After transit users meet the limit, additional rides are free for the rest of that day, week or month. Trips on each operator would be charged according to current transfer discount policies between operators. Products like Caltrain's ride book or AC Transit's 31-day pass would likely need to be phased out in favor of a standardized cap. Both VTA and AC Transit have currently eliminated transfer fees within their own systems in favor of day passes that function like accumulators.

64 Transport for London, "Adult Fares," https://www.tfl.gov.uk/fares-and-payments/fares?intcmp=1648
65 TriMet, "eFares," http://trimet.org/efare

STRATEGY 3

Develop transit hubs that make transferring easy.

If we're going to address the Bay Area's transit fragmentation, we have to focus on the ground level: transit hubs. These include large transit hubs but also encompass connections that may not be evident, such as transferring from Caltrain to BART in San Bruno, which requires a 10-minute walk.

Larger hubs can be more than just a transit stop. They can serve as a central place where transportation modes — including regional transit, local transit, specialized transit, cycling and accessible pedestrian networks — come together seamlessly. Transit hubs also make excellent locations for offices, hospitals, educational institutions, government services, restaurants, shopping centers and cultural attractions. Research shows that effective transit hubs are those that attract both riders and non-riders (i.e., those visiting the station merely to enjoy the public services and amenities).

Note: Some of the opportunities for creating great transit hubs have to do with information and transit service planning. These are discussed under Strategies 1 and 4.

Recommendation 10: Design great transit hubs, and plan for riders to make seamless transfers.

Who: Operators, cities, MTC, CMAs, cities, civic leaders and organizations

Transit stations act as key points of contact between the rider and the transit network, so stations have a considerable impact on the overall user experience. Well-designed transit stations can attract riders to the transit system and help make them feel more comfortable, relaxed and informed. Poorly designed stations can induce frustration and disorientation and discourage ridership. When designing transit stations, it is important to focus on both improving the user experience and offering transit the opportunity to perform well.[66] Keeping in mind both goals will ensure a good transit station for all. MTC

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and CMAs can fund planning for transit facilities that incorporate a human-centered design process and prioritize the customer experience across operators.

With ridership and population steadily increasing in the Bay Area, it's time to address the fact that renovations to the region's stations have been neglected. The aesthetic of our region's bus and rail stations should reflect the importance of transit to our region.[67] BART's Station Modernization Program aims to do this type of upgrading of its existing transit hubs, particularly those that see heavy and increasing usage.

Recommendation 11: Integrate transit hubs into neighborhoods, and improve hub access.

Who: Operators, cities, MTC, CMAs

Transit stakeholders — cities, business districts, planners and advocates — should all be aware of what makes a great transit hub and should work to improve local hubs.[68] Integrating transit hubs into neighborhoods and making them easy to access on foot reduces the need for transit services to get people to the station — a key benefit.

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[66] Transit hubs should be designed around both riders and transit operators. Transit infrastructure that improves passenger boarding conditions, safety and accessibility will help ensure increased performance of the transit service operating within the area. Better performance means a better network. See: Mbatta, Sando and Moses, "Developing Transit Station Design Criteria with a focus on Intermodal Connectivity," *Journal of the Transportation Research Forum*, vol. 47, no. 3 (2008). http://journals.oregondigital.org/trforum/article/viewFile/2121/1891

[67] For example, Grand Central Station in midtown Manhattan, which opened almost a hundred years ago, draws far more visitors to its shopping, dining and cultural events than to its transit. More than 750,000 people pass through the grand hall every day. Grand Central Station is an excellent example of how transit infrastructure can be designed to serve a multitude of civic functions.

[68] There are many resources on best practices on station hub design. For example, see: *Guidelines for Providing Access to Public Transportation Stations* (Transportation Research Board, 2012). http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_153.pdf

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Fare Integration for a Complex Transit System

Seattle's One Regional Card for All (ORCA) may look like a standard fare payment card, but it represents much more than the electronic version of a paper pass or cash. It's the product of years of collaboration and negotiations among the Seattle area's transit operators to deliver a unified system of consistent fares and policies and make transit more convenient for riders.[69]

Much like Clipper, ORCA is a smart card that contains both e-cash and passes.[70] The seven operators that serve the Seattle region all accept the ORCA card on diverse fleets of buses, ferries, light and commuter rail, and paratransit vehicles. These operators range considerably in size, from Everett Transit, which operates 49 buses in the City of Everett, to Sound Transit, which operates 243 buses, 58 commuter rail cars and 68 light rail cars across three counties. As in the Bay Area, each operator has its own fare structure. Sound Transit charges by distance or zones crossed, whereas King County Metro Transit, which primarily serves Seattle, charges a flat fare that only varies by peak and off-peak times of day.

However, when it comes to transit passes, the two regions' systems diverge. In the Seattle area, passes are only available via the ORCA card, and they are not operator-specific. If an Everett resident regularly commutes to Seattle by taking an Everett Transit bus to a Sound Transit bus, she will likely buy a monthly PugetPass. If she has to start her day with a meeting in downtown Bellevue one morning, she can take Everett Transit to Community Transit to her meeting and then hop on a Sound Transit bus to downtown Seattle, all with the same pass. ORCA has essentially eliminated her need to plan for transfer costs between operators or to worry that one operator won't accept another operator's pass.

How did the Seattle transit system get here? How did operators agree to give up transfer discounts and operator-specific passes? Since the 1970s, operators have collaborated on paper fare products that offered discounts for riders who regularly transferred between two systems. Agencies tended to approach these agreements on an ad hoc basis, which caused the number of potential passes to balloon to more than 300.[71]

By the early 1990s, demand had grown for a regional pass or fare product that would simplify transfers and fares between operators. Simultaneously, leaders at the state and regional levels decided that regional rail was a beneficial transportation investment. In 1990, when the state legislature passed legislation that allowed for a regional transit planning and local taxing authority, three Seattle area counties (King, Pierce and Snohomish) created the Regional Transit Authority (RTA).[72] In 1996, the RTA took its 10-year regional transit proposal, Sound Move, to voters in all three counties for approval. Sound Move created Sound Transit,

flickr user Stephen Rees

a new regional transportation agency, and adopted a mandate to develop a uniform single-ticket fare system.[73]

Soon after Sound Move passed, Sound Transit led other Seattle operators in negotiations over regional revenue-sharing agreements that would facilitate paper multi-operator passes in the short term and regional fare products, available on a smart card, in the long term. Operators created a governance system that granted one vote to each operator, regardless of size, to vote on changes to revenue sharing, technology procurement and pricing. Over the next 12 years, the agencies reconciled business rules, resolved disputes regarding revenue shortfalls to individual operators, and established a regional fund to facilitate sharing fare revenue. Notably, larger operators established a temporary subsidy for smaller operators to make the transition to the regional pass financially feasible. Ultimately, the Washington State Ferries did not join the PugetPass; however, its passes are still available on ORCA.

Publicly launched in June 2009, ORCA has been heralded as a major success. It's proven that even complex transit environments with multiple operators can achieve fare integration and that standardizing fares need not strip transit agencies of control over fare setting. Provided that operators stick to agreed-upon guidelines, individual agencies still set their own basic fares.

The primary beneficiary of ORCA is the transit rider: Gains for customers have exceeded goals.[74] However, transit operators have also benefited considerably from the ORCA card. For example, better data on transit travel patterns (which the card provides) have helped operators negotiate fare-sharing agreements more equitably. Operators have also incorporated the ORCA data into service planning and made it easier for businesses to purchase and manage passes for employees.

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[69] Leah Harnack, "Implementing Regional Fare Systems," *Mass Transit*, March 2010.
[70] ORCA, "About ORCA," https://www.orcacard.com/ERG-Seattle/p3_001.do?m=3
[71] Transit Cooperative Research Program, *Improving Transit Integration Among Multiple Providers, Volume I* (Transportation Research Board, 2014). http://nelsonnygaard.com/wp-content/uploads/2015/01/tcrp_rpt_173v1.pdf
[72] *Sound Transit History and Chronology,* Sound Transit (October 2007). http://www.soundtransit.org/Documents/pdf/about/Chronology.pdf
[73] Transit Cooperative Research Program, *Improving Transit Integration Among Multiple Providers, Volume I* (Transportation Research Board, 2014). http://nelsonnygaard.com/wp-content/uploads/2015/01/tcrp_rpt_173v1.pdf
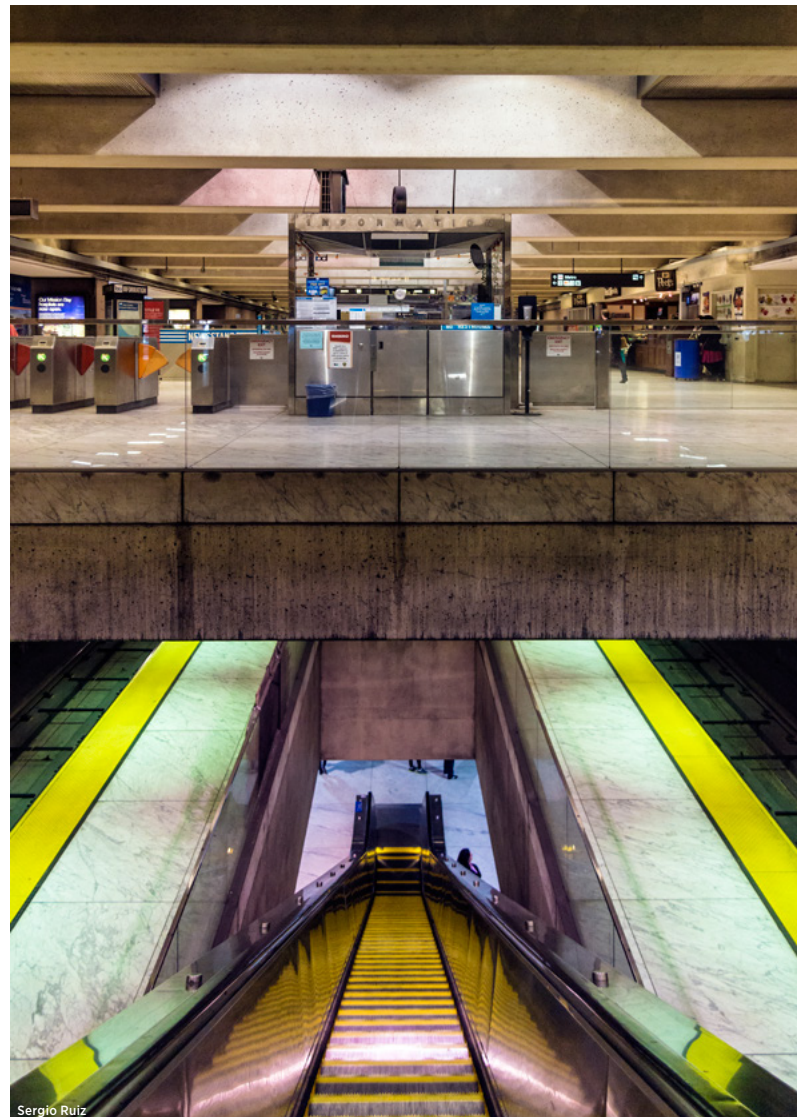[74] *Ibid.*

A transit hub is never "done." Transit hubs should be places that evolve as transportation options evolve and as the surrounding city evolves. Good wayfinding is a simple way cities can improve hubs. Cities can also support transit hubs by providing pedestrian or bicycle access. Ideally, transit hubs are part of dense and compact activity centers.

Transit hubs should be considered carefully as part of local transit-oriented development planning, local capital programs, business district strategies, safety programs, programs to change travel behavior and environmental programs.

How do we know if an improvement to a transit hub works for riders? In the past, it has been difficult to collect aggregate data about how wayfinding projects or other physical changes to a station affect traveler behavior. Instead, we have relied on measuring the facility (e.g., signage, distances) rather than people (e.g., travel time, transfer decisions). In the future, we should measure how improvements to transit hubs have increased ridership, reduced wayfinding stress, boosted transit's operational performance and the like. Especially at heavily used connection points, the performance of a transit hub for different groups — such as those with low literacy, those with mobility impairments or those with vision impairment — should be evaluated and continually improved.

Today, with mobile technology and crowdsourcing, studies can be designed to measure changes in behavior and customer experience. Such data collection efforts should be funded as part of strategies that encourage travelers to shift from other modes to transit, such as marketing, wayfinding or design projects.

In many instances, responsibility for a hub's performance is dispersed among many players. SPUR recommends that one party take the lead in being accountable and providing regular reporting on transit hub performance.

STRATEGY 4
Use an integrated approach to transit network design.

Looking at transit service in an integrated way can lead to quicker, less expensive and more effective solutions to meeting demand. For example, a more integrated, corridor-based planning approach might allow us to solve rush-hour congestion problems in the Bay Bridge corridor more efficiently. Building a second Transbay Tube for BART could be postponed until absolutely necessary if enhanced bus services could provide a 20-year solution. In the short term, more regional buses could help alleviate capacity crunches on transit and on roads.

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Recommendation 12: Identify a high-frequency, high-capacity core regional transit network, and set performance goals for it.

Who: MTC, CMAs, operators, cities, civic leaders and organizations

While many stakeholders agree that local transit services should be designed locally, they also agree that there should be a core regional transit network in the Bay Area that is designated as the region's stable, high-capacity, high-frequency transit backbone. A core network would focus on transit performance goals — not on who operates the services.

An example of a core network is TransLink's Frequent Transit Network in Vancouver, a network

Improvements in the multi-operator experience should be prioritized in the urban hubs with the most potential new riders, like the Embarcadero BART and Muni station in downtown San Francisco.

of corridors where transit service runs at least every 15 minutes in both directions throughout the day and into the evening, every day of the week. Defining such a network creates certainty for land use and transportation planners and helps to market locations near frequent transit for development.[75]

As a step toward implementing Plan Bay Area, SPUR suggests that MTC, transit operators, the business community and other stakeholders define a regional core network and an associated set of performance goals for it. The measures would include frequency of service, hours of service and timed connections. In the future, some amount of transit service and infrastructure investment could be targeted at maintaining a designated level of service on this core network. The core network could be adjusted in the future to reflect growth patterns and other changes in the operating environment.

This regional core network concept has been discussed in various ways in the Bay Area, including in the recent MTC Transit Sustainability Project, but it is still not a reality. MTC and Bay Area CMAs and operators should make it a priority. Some operators, such as VTA and SFMTA, have defined frequent transit networks for their service areas and are emphasizing these networks on maps.

Recommendation 13: Respond to cross-county demand for bus transit.

Who: MTC, operators, CMAs, Bay Area Toll Authority

Some travel paths that cross county lines might benefit from new public transit, but there's no clear way to create those services when many transit operators' coverage areas stop at the county line. We have identified options for creating more cross-county bus services:

- Grow the role of existing regional agencies to deliver cross-county services. For example, Caltrain could run buses from San Francisco to the Peninsula on Highway 101, or BART could take over AC Transit's late-night bus routes along the BART line in the East Bay. Any new regional bus service should aim to make more efficient use of the region's existing bus fleet, maintenance yards and other facilities.

- Develop new consortiums like the Dumbarton Express to run regional services. However, we should not add new transit brands in the process. Clipper or another existing brand could be used.

- Change state legislation or memorandums of understanding so that the rules don't limit services from crossing county lines. This would enable operators to respond to cross-county demand instead of ending service at transit hubs on the county line and forcing riders to transfer. For example, during the America's Cup in 2014, a flexible arrangement made it possible for Golden Gate Transit to pick up passengers at more locations in San Francisco. In a possible pilot project, AC Transit buses could provide service past the Transbay Transit Center in San Francisco.

75 For more information, see: "Frequent Transit Network," TransLink, http://www.translink.ca/en/Plans-and-Projects/Frequent-Transit-Network.aspx

Recommendation 14: Integrate short-range planning for transit services, especially where operators share a market or service area.

Who: Operators, CMAs

Where operators share riders or service areas, it makes sense to coordinate service planning. The benefits include more rational routes, better use of vehicles and higher ridership. Riders can experience expanded options and more frequent service. The existing Short-Range Transit Planning process, which MTC requires, could expand to integrate individual plans or to focus on county- or sub-region-level plans. These Short-Range Transit Plans could include performance metrics or targets, institutional goals and timelines.

Integrated short-range plans might make sense for transbay buses and BART, as well as for the Peninsula corridor, the I-680 corridor, the I-880 corridor and the I-80 corridor.

New data sources such as Clipper usage or mobile data can now improve the joint service planning process by providing insights on how people travel and how they respond to service or fare changes.

Recommendation 15: Use the regional transportation funding process to encourage the development of a cohesive regional network.

Who: MTC, CMAs

The next Regional Transportation Plan and Sustainable Communities Strategy should focus more on transit as a regional network than as an aggregation of investments. For many historical reasons, regional, state and federal agencies fund transit capital projects separately from transit operating costs and do not allow funds to be transferred from one to another. For that reason, this recommendation applies only to the capital planning and funding process and not to transit service planning.

There are several ways to implement this recommendation:

- Refine the Regional Transportation Plan process to consider transit projects as part of a network. Add new analysis that assesses the quality of transit connections — and goes beyond passenger wait time to include things like integrated fares, short transfer distances and universal accessibility. This analysis should also weigh the benefits of customer experience improvement projects, such as wayfinding, alongside capital projects.

- Adopt MTC policy to require seamless connections between operators as part of regional transit capital investments. Develop operational goals for these connections.

- Improve the way CMA performance assessments evaluate projects to drive investments toward projects that contribute to the development of a more integrated transit network. Similarly, projects should be evaluated on whether they lead to increased fragmentation of the transit network.

STRATEGY 5
Use institutional practices to promote integration.

Recommendation 16: Incentivize system consolidations when they benefit customers.

Who: State legislators, MTC, CMAs, civic leaders and organizations, California State Transportation Authority

SPUR believes that having fewer operators in the region would make all types of integration efforts easier and would have benefits both for riders and for growing transit's market share. To promote those system consolidations that make the most sense, local, regional, state and federal funding programs could be altered to incentivize consolidation. In some cases, there is already interest in consolidation, but some outside resources are needed to move the conversation forward. Options for funding integration are named on page 31.

Recommendation 17: Evaluate long-term governance choices.

Who: MTC, civic leaders and organizations, California State Transportation Agency

What governance changes — either consolidations, collaborations or new authorities — would help our region move forward faster with transit integration? The expansion of BART to Santa Clara County, the prospect of high-speed rail, Caltrain's ongoing funding instability and the introduction of SMART rail (and eventually California High-Speed Rail) all present opportunities to evaluate long-term governance changes.

Another question that needs further discussion is: Which agency will be most successful at leading various types of integration efforts? One possibility many stakeholders suggested during our research was BART, particularly if it operated more regional services such as buses. If an agency other than MTC were interested in becoming responsible for transit coordination in the region, it would require a change in the state law. Experiences in other regions suggest that the state can play a useful role in changing governance structures.

Governance options should be considered through dialogue and with careful study of the desired public benefits and the ways they can be achieved. New transit or transportation tax measures can present an opportunity to consider governance changes. For example, the Central Puget Sound Regional Transit Authority was created by a 1996 regional transit sales tax in three counties called "Sound Move." The agency now uses the customer-facing brand Sound Transit to market express buses, commuter rail and light rail service in a unified way.[76]

Recommendation 18: Facilitate dialogue among regional transit operators.

Who: MTC, CMAs, operators, civic leaders and organizations

While there are select occasions when the region's transit operators meet, SPUR sees a need for an inclusive, ongoing dialogue about the many issues raised in this report. A regular conference of operators or a similar convening could offer a forum to discuss integration plans, share best practices and build relationships. It could be similar to the Bay Area Congestion Management Agency Directors group. Sub-regional dialogue among transit operators would also be useful for promoting integration.

Recommendation 19: Grow new capacity to address the regional transit experience.

Who: MTC, operators, CMAs, academic institutions, civic leaders and organizations

SPUR's research found that better access to data and better tools to evaluate problems and prioritize solutions could help transit agencies seize many opportunities to provide a more integrated customer experience. The following recommendations specify some of the resources and practices that could promote transit integration in the Bay Area.

Establish business and data leaders at MTC and transit operators.
Using data to understand what is happening in the transit system today helps to improve customer service. But it takes skill, resources and policies to use data. As a case in point, it took MTC until 2014 to make Clipper data public. A few operators have business and data analysts on staff today; we need to grow their ranks across the region. MTC should provide operators with services to help them make use of data, especially those operators that do not have any in-house data analysis capacity. A strong business analyst would use data about infrastructure, travelers and finances to improve the customer experience and inform long-range planning decisions.

While there may be some overlap with existing chief information officer positions at some operators, the business analyst would focus on cultivating and using data rather than on managing all information technology systems.

At MTC and transit operators, the staff serving this function would also be the customer advocate in technology procurement, who would ensure that data would be made available to improve customer service. Those in this role would also strive to make sure that databases and systems can work together to produce and share data.

Increase the collection, sharing and use of transit data, and create a regional data clearinghouse.
The public sector should increasingly focus on collecting new data and making data available for others to use. Data does not help passengers unless it is accurate; the public sector should also focus on ensuring data quality and measuring data accurately. Transit and other transportation agencies can collect and share the following types of data, among others:

- Traveler data (routes, distances, transfers, etc.)
- Traveler response to changes in service, fares and incidents
- Schedules
- Real-time vehicle locations
- Real-time arrival times
- Transfer instructions
- Incident reports
- Roadway conditions (for buses or light rail in mixed-flow traffic)
- Vehicle occupancy
- Park-and-ride availability
- First- and last-mile solutions: use of local shuttle buses, bike sharing, etc.
- Historic information on transit ridership and performance, to enable predictive capabilities

Protecting privacy should be a chief concern for all involved, and both legal and technological solutions exist to safeguard the privacy of the traveler. Developing privacy policies and agreements will be a necessary step for using some data sources, such as Clipper.

Crowdsourced data will become increasingly available to use for planning and operations; MTC can work with operators to take advantage of this opportunity. Such data may have fewer privacy-related limitations than other data sources.

Establish customer experience leaders at transit operators.
Especially at the large operators, a single person or office could focus on improving and coordinating all aspects of the customer experience, including marketing, maps, stations/stops and data. This may also be a necessary role at joint powers boards (such as the board that runs Caltrain). Customer experience leaders from different agencies could work together to improve transit trips that involve multiple operators.

Evaluate integration efforts and share findings.
It's likely that there's much to be learned from the region's integration efforts to date. For example, what were the costs and benefits of Clipper to riders and operators? What has the regional Hub Signage Program taught us about improving transit hubs? MTC and others who have led integration efforts can help the region by doing retrospective evaluations and sharing with stakeholders the lessons learned from both successes and failures. ⚙

Conclusion

Because we have failed to make our many public transit investments seamless, the transit system simply doesn't work for many people and many trips. Today's fragmented public transit system is problematic for those who live in and visit the Bay Area, and it's a threat to the region's future. The costs to families, to the environment and to the economy could mount if we don't solve these problems.

There are no easy answers to regional transit fragmentation, and it is certainly difficult to tackle regional challenges while also providing great local transit service every day and night. However, a new generation of Bay Area transit riders expects a better regional transit system. We should challenge ourselves to break down barriers, work to improve the regional transit experience and grow transit user satisfaction.

When we imagine the region's transit system in the future, we envision a more integrated, more cohesive system that's well understood — and well used — by a greater number of people.

The definition of transit might be evolving, as evidenced by the popularity of ride-hailing services and new privately run transit services, but the ideas will remain the same: We can make public transportation information clearer, more consistent and more available. We can improve the experience of switching from one operator to another. And we can get more transit bang for our buck by looking at transit services in an integrated way rather than in silos. All of these improvements would attract new riders and build confidence in the region's transit system.

Maintaining economic prosperity and growing sustainably require that we pay more attention to the intricacies of our transit system. SPUR is optimistic that by working together, we can make our region's many transit services function like one seamless network. ⚙

Plan of action

Strategy	Recommendation	Metropolitan Transportation Commission	Transit Operators	Congestion Management Agencies	California State Transportation Authority	Cities	Civic Leaders and Organizations	Bay Area Toll Authority	Bay Area Bike Share	Large Institutions and Employers	Academic Institutions
Strategy 1: Help travelers understand the value of the region's transit system and how to use it	**Recommendation 1:** Develop marketing for the regional transit system	✓	✓								
	Recommendation 2: Provide clear, consistent and ample transit information across the region	✓	✓			✓					
	Recommendation 3: Develop great regional transit maps	✓	✓								
	Recommendation 4: Support third-party providers of transit information and tools	✓	✓								
Strategy 2: Standardize fares and develop passes that encourage use of the region's entire transit system	**Recommendation 5:** Develop regional, integrated fare products	✓	✓				✓			✓	
	Recommendation 6: Develop a regional fund to facilitate new regional fare products, and adopt a revenue-sharing agreement	✓			✓						
	Recommendation 7: Use a consistent fare-setting schedule that favors regional coordination		✓								
	Recommendation 8: Encourage variable pricing and develop a means-based fare payment program at the regional level	✓									
	Recommendation 9: Ensure that regional transit fare payment is convenient and reliable	✓	✓		✓			✓	✓		
Strategy 3: Develop transit hubs that make transferring easy	**Recommendation 10:** Design great transit hubs, and plan for riders to make seamless transfers	✓	✓	✓		✓	✓				
	Recommendation 11: Integrate transit hubs into neighborhoods, and improve hub access	✓	✓	✓		✓					
Strategy 4: Use an integrated approach to transit network design	**Recommendation 12:** Identify a high-frequency, high-capacity core regional transit network, and set performance goals for it	✓	✓	✓		✓	✓				
	Recommendation 13: Respond to cross-county demand for bus transit	✓	✓	✓				✓			
	Recommendation 14: Integrate short-range planning for transit services, especially where operators share a market or service area		✓	✓							
	Recommendation 15: Use the regional transportation funding process to encourage the development of a cohesive regional network	✓		✓							
Strategy 5: Use institutional practices to promote integration	**Recommendation 16:** Incentivize system consolidations when they benefit customers	✓		✓	✓		✓				
	Recommendation 17: Evaluate long-term governance choices	✓			✓		✓				
	Recommendation 18: Facilitate dialogue among regional transit operators	✓	✓	✓			✓				
	Recommendation 19: Grow new capacity to address the regional transit experience	✓	✓	✓			✓				✓

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