



2023 Study Delegation of San Francisco Bay Area Transit Professionals to Switzerland

Joint Final Report
December 2023

**Study Delegation of San Francisco Bay Area
Transit Professionals to Switzerland**
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December 20, 2023



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Executive Summary

Executive Summary

As the Bay Area's regional transit systems work to overcome pandemic-related ridership losses and financial challenges, there is increasing sentiment that ensuring the survival of these essential public services will require a focus on transforming and improving the regional network.

With that in mind, a delegation of Bay Area transit leaders and advocates had an opportunity to visit Switzerland in June 2023, where decades-long efforts to build a world-class transit system have facilitated a remarkable pandemic recovery. As of the delegation's visit, Swiss officials reported that average transit ridership across the country had recovered to 100% of pre-pandemic levels, in spite of significant shifts to remote work.

In Switzerland transit service is plentiful and connects the country's nine million residents with "clock face" coordinated timetables and integrated fares. Nationwide, travelers complete over 21% of their trips on transit, and over 50% of commuters in the country's largest cities choose transit, with the 1.6 million residents Zurich metro area boasting an amazing 32% transit mode share overall.

Switzerland has some similarities to the Bay Area population, but there are also some differences. During this visit, delegation members met with Swiss experts; learned how the country organizes, operates, and funds its public transit systems; and brought those lessons home to inform our region's ongoing work to improve transit connectivity and recover ridership.

The delegation came away with an understanding that Switzerland's success in public transportation, including its high and increasing levels of investment, cannot be separated from its highly developed systems for regional and nation-wide coordination and network management. Three specific practices were of particular focus for the delegation:

- **Integrated, clock face timetables** that are coordinated across all operators and create a more highly utilized system
- **Coordinated infrastructure planning**, where all capital projects are based on a clear long-term service vision backed by stable and predictable funding
- **Integrated fares**, organized at both the national and regional levels, that have built ridership while providing a significant amount of fare revenue.

The delegation came away with numerous lessons from Swiss experience, including:

- **Focus on the customer, and recognize varied travel needs.** Most riders use a variety of types of service to meet different needs, and therefore benefit from greater simplicity and common regional standards.
- **Successful collaboration between regions and operators is built on clear role definition.** It is possible to have successful coordination in an environment with many operators, as long as clear roles for the region and for operators are defined.
- **Treat transfers as the 'base case', not the 'edge case'.** A successful planning principle is to plan networks around high quality transfers at key nodes.

- **Give street level public transit priority over private vehicles.** Switzerland's trams and buses offer fast, reliable service due to dedicated lanes and signal priority, in combination with other policies that restrict driving in central areas.
- **High service levels underpin the success of all other strategies.** Across Switzerland, levels of transit service have increased steadily over the past many years, and high service levels contribute strongly to high ridership.
- **Invest in capital & operations strategically based on a long range service vision.** A long range service vision should be the basis for effective incremental capital & operations investments.
- **Proceed with large capital projects once full costs and risks are known.** Cost overruns are rare in Switzerland in part because construction funds are only committed to projects - confirmed by public voter initiative - much later in the project development process than in California.
- **Public ownership of rail and transit rights is important.** Switzerland has been able to strategically balance rail for both freight and passenger use because the country's rail infrastructure is entirely within public ownership, managed by a publicly owned company, SBB.
- **Bold and deliberate policy changes were part of a clear 'pivot'.** A successful ballot measure in 1982 connecting new investment with policies and governance that advanced integration was a key turning point in the history of the Zurich region.
- **A virtuous cycle of increasing investment and ridership is achievable.** Success breeds more success - tangible benefits of increased, coordinated service have attracted more riders, strengthen support for additional investment.

The delegation sees significant potential for the study visit to result in lasting positive improvements to Bay Area transit. Recommended next steps to leverage this experience include:

- Applying lessons learned to existing and future coordination initiatives, including those identified in the Transformation Action Plan (including Connected Network Plan/Transit 2050+, Fare Coordination and Integration Study, Mapping and Wayfinding plans, and others);
- Pursuing ongoing relationships and learning opportunities both among Bay Area transit professionals at agencies, and with other regions; and
- Conducting further research on other successful transit practices not addressed through this delegation.



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Chapter 1

Introduction

Chapter 1: Introduction

Why Switzerland?

Switzerland's highly successful transit system is recognized as one of the most effective and user-friendly in the world. Transit service is plentiful and connects the country's nine million residents with "clock face" coordinated timetables and integrated fares. Nationwide, travelers complete over 21% of their trips on transit, and over 50% of commuters in the country's largest cities choose transit, with the 1.6 million residents Zurich metro area boasting an amazing 32% transit mode share.

But it wasn't always this way.

Starting in the 1950s, transit ridership in Switzerland declined dramatically as car ownership and roadways expanded. Policymakers responded in the late 1960s with plans to build a national high-speed rail line, only to see it rejected when the public saw little benefit in the plan for those outside major cities.

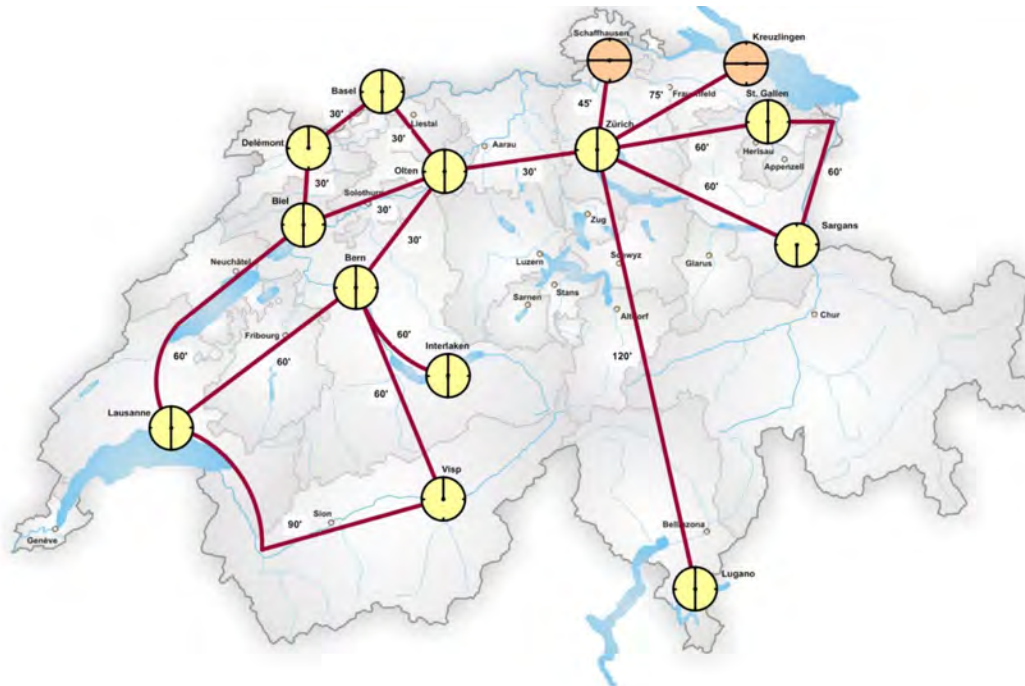
Comparison of Switzerland, Zurich Canton, and the San Francisco Bay Area

(Sources: Switzerland Federal Office of Transport, ZVV, Plan Bay Area 2040, Plan Bay Area 2050)

	Switzerland	Zurich Canton	San Francisco Bay Area
Land Area	41,285 km ²	1,729 km ²	22,789 km ²
Urbanized Area	7.9%	20.1%	17.8%
Population	8.6 million	1.6 million	7.5 million
Transit Mode Share	21%	32%	5%
Transit operators	260	37	27
Counties/Cantons	26	1	9
Cities/Municipalities	2,000+	160	101

Zurich voters responded similarly by overwhelmingly rejecting plans for an underground light-rail system in 1962, and then defeating a multi-billion-dollar plan for a U-Bahn (subway) system in 1973.

In the 1980s, Swiss transit officials found inspiration in the Dutch "pulsed" timetable, with regular timed service intervals. The concept was adopted in 1982 by SBB, the Swiss national rail authority, and its success led to the 1987 voter approval of Rail 2000, a 130-project ballot measure that led to rapid expansion of the national rail system, with an SBB-coordinated, fixed interval timetable standard as its foundation. National and local transit funding measures have passed consistently since then, and have led to higher frequency service throughout the system with the original one hour interval improving to 30 minutes, or in some cases 15 minutes.



National service plan for “clock face” schedules. Target travel times (in minutes) between major cities are indicated along the lines, with the goal of being in increments of 30. The clock image at each major city indicates when, during each hour, schedules are coordinated to align with - for example, in Zurich, trains are scheduled to arrive just a few minutes before the hour and the half hour (:00 minutes and :30 minutes), and depart a couple minutes after.

The experience in Zurich was similar. After the defeat of a 1973 ballot measure to build a new subway (U-Bahn) system, regional leaders developed the ‘Zurich Model’ of public transit, which would be based on the same national integrated clock face philosophy along with integrated fares across the region’s network of tram and regional rail lines. In 1981, Zurich leaders brought this vision to voters with a proposal for an expanded regional “S-Bahn” (regional rail) network that would be seamlessly coordinated with local bus systems. The measure would also create ZVV, a new regional authority that would manage the integration of regional transit operations. The measure passed with 74% in support, a dramatic turnaround from the failed measure just eight years earlier.

Today, ZVV coordinates 37 transit operators, including the nation-wide rail operator SBB, to oversee the integration of operations, fares, service planning, rider experience, and more. Since 1990, when the S-Bahn opened and the common integrated zone-based fare structure was introduced, the ZVV-managed transit network has produced dramatic and sustained increases in ridership, including a 35% increase in per capita transit trips between 1990 and 2014. Service levels have increased by 75%, levels of driving have reduced, and the region’s voters have consistently approved more investment in the expansion of the network.

What riders in Switzerland experience today is the result of many years of hard work – including concerted advocacy, reforms to institutions, political debate, and governance changes – that collectively led to Swiss voters consistently approving ballot measures creating even more investment in the system.

Study Delegation to Switzerland

Origin and Goals

While there are many differences between the San Francisco Bay Area and Switzerland, there are several similarities including the presence of numerous transit agencies and jurisdictions, a diversity of different funding sources for public transit, and a tradition of ballot initiatives.

To understand potential lessons of Switzerland's transit practices for the Bay Area and California, a Virtual Conference, [SwissCal](#), was organized in early 2022 by Seamless Bay Area, to bring together Swiss public transit leaders and California transit leaders for a series of presentations and discussion to share Swiss best practices. SwissCal had participation from Swiss officials from various levels of government, and included participation from over fifty Californian public transit professionals and policymakers, including representatives from Bay Area transit agencies, MTC, Caltrans, LA Metro, Southern California Association of Governments, and Stanford University's Bill Lane Center for the American West. Due to positive feedback from participants on the value of this knowledge exchange and interest in deeper learning, Seamless Bay Area worked with the Swiss Consulate General of San Francisco to submit an application for a funded study delegation to Presence Switzerland, an Swiss government agency, which was approved in early 2023.

The goals of the delegation, according to Presence Switzerland, were to provide participants with:

- A first-hand experience on how a seamlessly integrated public transit system works from the perspective of a rider,
- An in-depth exchange with Swiss policy makers and experts from the Swiss transportation industry,
- The opportunity to create a network for possible future collaborations and partnerships.

Participants

The following were the participants of the study delegation, representing the Bay Area's major transit agencies, key regional stakeholders, and two representatives from outside the Bay Area:

- **Theodore Burgwyn**, Director of Rail Network and Operations Planning, *Caltrain*
- **Cindy Chavez**, Santa Clara County Supervisor, *Santa Clara County Board of Supervisors*
- **Robert Del Rosario**, Department Director, Service Development & Planning, *Alameda-Contra Costa Transit District (AC Transit)*
- **Tyler Dos Santos-Tam**, City Councilmember, *City & County of Honolulu*
- **Charles Drane**, Chief Maintenance Officer – Maintenance of Way, *San Francisco Municipal Transportation Agency (SFMTA)*
- **Ian Griffiths**, Policy Director, *Seamless Bay Area*
- **Brent Jones**, Chief Transportation Officer – Transit Operations, *San Francisco Municipal Transportation Agency (SFMTA)*
- **Barbara Klein Barr**, Division Director, International Program, *U.S. Department of Transportation (USDOT)*

- **Hannah Lindelof**, Strategic Planning & Policy Group Manager, *San Francisco Bay Area Rapid Transit District (BART)*
- **Seamus Murphy**, Executive Director, *San Francisco Bay Area Water Emergency Transportation Authority (WETA)*
- **Theresa Romell**, Funding Policy and Programs Section Director, *Metropolitan Transportation Commission (MTC)*
- **Laura Tolkoff**, Interim Chief of Policy and Transportation Policy Director, *San Francisco Bay Area Planning and Urban Research Association (SPUR)*
- **Jay Tyree**, Transit Service Planning Manager, *Santa Clara Valley Transportation Authority (VTA)*

Study Delegation Agenda

Over the course of five days, the delegation visited numerous Swiss authorities representing several levels of government within Switzerland's public transit ecosystem. On the final day, the delegation also met with academic and private-sector representatives. The group received customized presentations relating to the specific objectives for the delegation, and copies of the presentations were then shared. The delegation had further opportunities to network with Swiss officials over meals and in between sessions, and several of the delegation participations have had follow up communications with the Swiss officials since the visit.

The delegation traveled across much of the country, and within the regions of Zurich and Bern almost entirely by public transportation, experiencing the full range of modes offered - intercity trains, regional trains (S-Bahn), local trams, buses, as well as ferry boats, gondolas, and cog-wheel railways.

Organizations visited during study delegation

Organization Visited	Role within Swiss Public Transit Ecosystem
Federal Office for Spatial Development ARE Federal Office of Transport FOT	Federal Policy, Planning & Funding
Swiss Association of Public Transport Alliance SwissPass	National Associations/Programs
Zurich Transport Authority (Zürcher Verkehrsverbund, ZVV)	Regional Network Manager: Policy, Planning, Funding
City of Zürich Zürich Public Transport (VBZ)	Local Planning & Operations
Institute for Transport Planning and Systems at the Swiss Federal Institute of Technology Zurich Empa - Swiss Federal Laboratories for Materials Science and Technology Start-ups in the public transportation ecosystem Stadler Rail	Non-Profit/Private

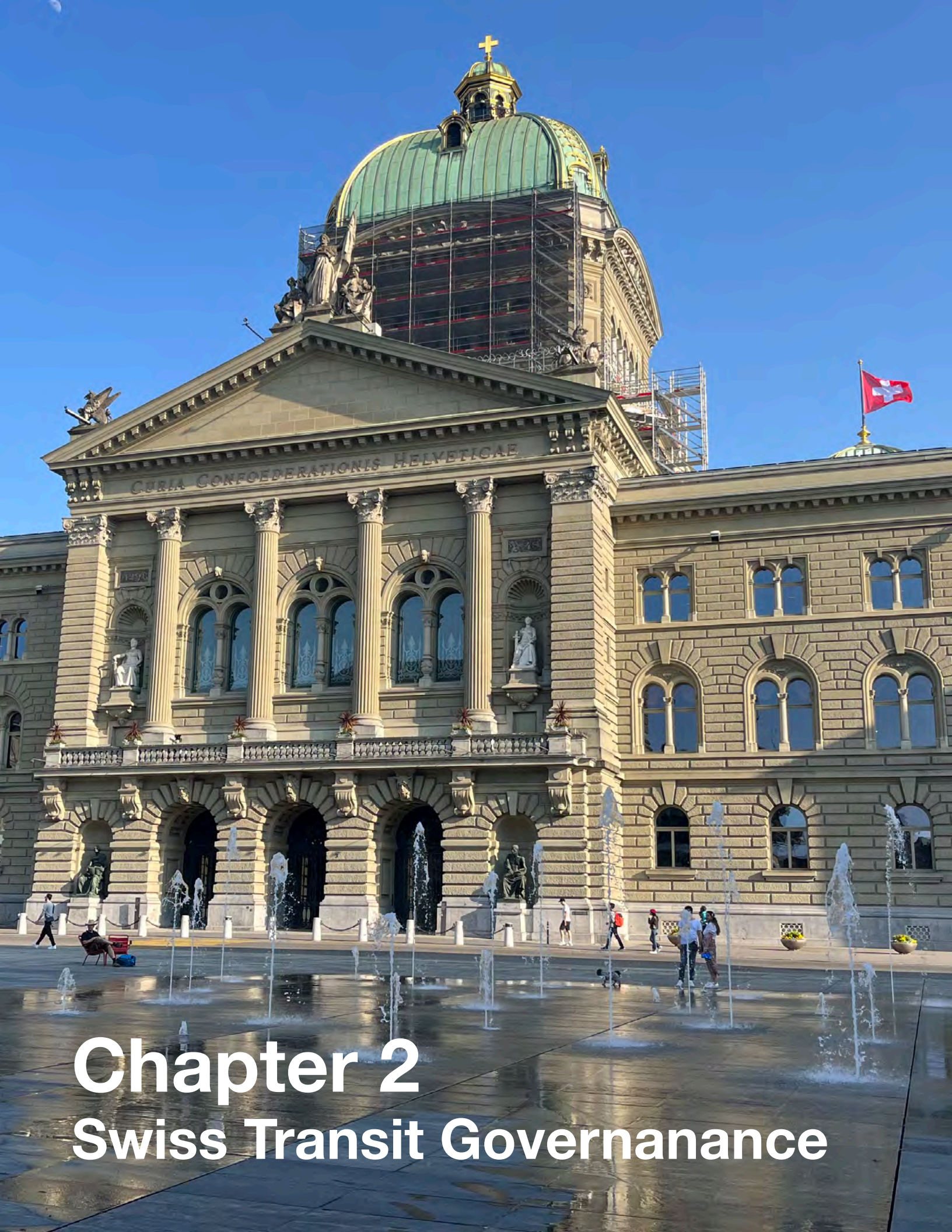
Findings

What follows in this report is a detailed description of the key dynamics and features that contribute to the enviable outcomes and unquestionably successful performance of the Swiss transit system today. This report has been voluntarily compiled by the participants of the Study Delegation tour based on the materials shared by Swiss experts, and follow-up research.

Chapter 2 provides an overview of the Swiss system for public transportation governance and financing, including the roles of the federal, regional (canton), municipal governments, and transit operators.

Chapters 3-5 document three specific Swiss practices that the delegation found to be key to the country's success - integrated timetable planning, coordinated infrastructure planning, and the principle of 'One Journey, One Ticket' or fare integration.

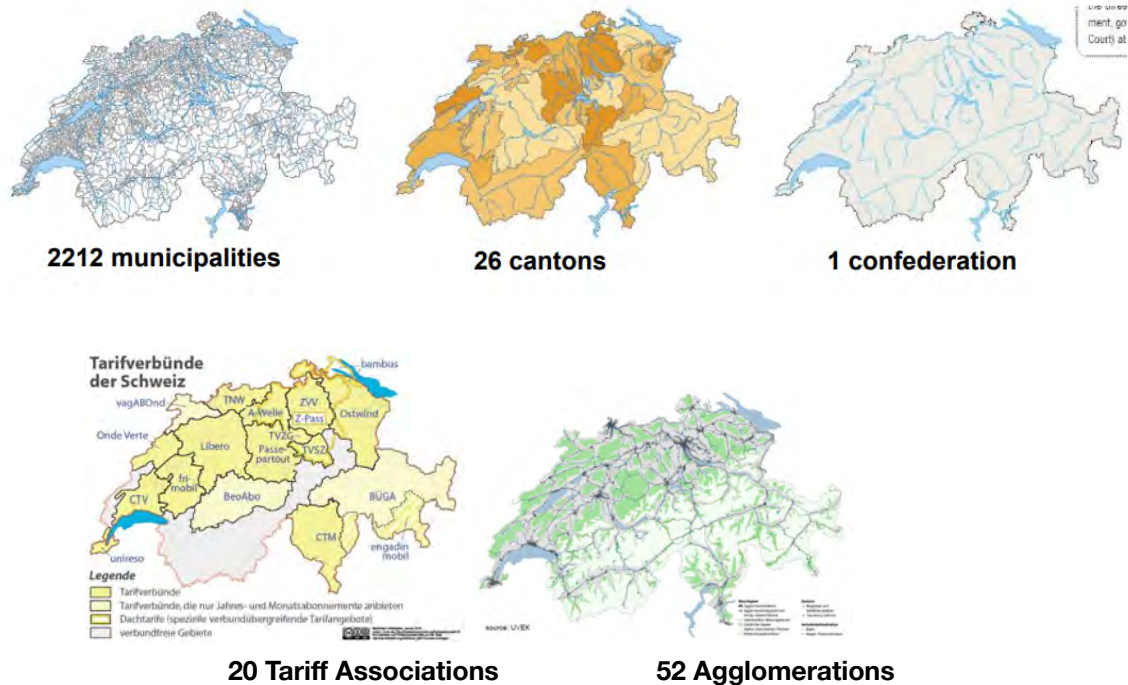
Finally, Chapter 6 describes lessons learned from the experience for the Bay Area, and Chapter 7 summarizes proposed next steps for consideration by the Bay Area transit agencies, MTC, advocacy groups, elected leaders, and other stakeholders.



Chapter 2

Swiss Transit Governanance

Chapter 2: Swiss Transit Governance



Numerous Swiss levels of government involved in public transit

Transit governance in Switzerland consists of an intricate system with many stakeholders including the federal government, cantons, cities/municipalities, 260 transit operators (60 rail operators plus bus, ferry, cableway etc), 20 tariff associations, and other stakeholders.

Overall, the Swiss system enables well-aligned policies and national cohesion across different layers of government. The political system emphasizes consensus-building with an emphasis on serving the public good. A well-developed social safety net provides universal healthcare, education and social services in addition to a robust transport network. In addition, national, regional and local policy and planning, along with transit supportive local policies such as housing densification, further support high quality transit.

This report focuses only on the government roles related to transit.

Confederation/Federal Government

Structure, Roles and Responsibilities

Federal Office of Transport (FOT)

In 1898, Swiss voters approved the nationalization of railways, and in 1902, SBB, the publicly owned national rail operator was established. While SBB is the largest rail operator in the nation, the

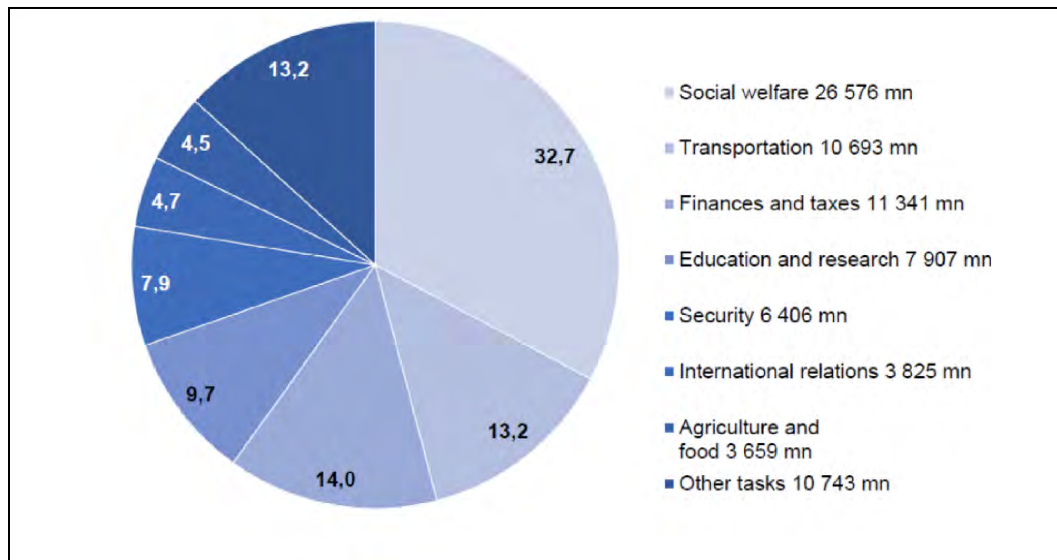
state-owned rail network includes 60 rail companies as well as freight, all of which is managed by the Federal Office of Transport (FOT). FOT sets the national framework for transit service in the country and is responsible for planning long distance passenger and freight transport services, integration of all transport needs, assessment and priority setting for expansion of rail infrastructure, and developing expansion phase planning. Coordination with other countries and connectivity to the international high-speed network and Europe at large is also done at the federal level.

FOT requires close cooperation/coordination between public transport providers via legal obligation and participation in Alliance SwissPass (see Chapter 5 for more information). This required collaboration is for providing direct service where needs exist, as well as developing standard fares and tickets. Other requirements include “open access” to public transport (no fare gates), no obligatory reservations, coordinated timetable, and flexibility (no restrictions on time of travel). Long-distance, regional and local services receiving public funds must all cooperate, and private operated services can volunteer to opt in.

FOT mobility plans are developed in close coordination with the Federal Office for Spatial Development, which develops the overall land use and growth plans for the country.

Funding

The Swiss commitment to social welfare is illustrated in the federal budget where nearly a third of the 2022 federal expenditure went to this need. Transportation is in the top three areas of government spending at 13.2% of expenditures.

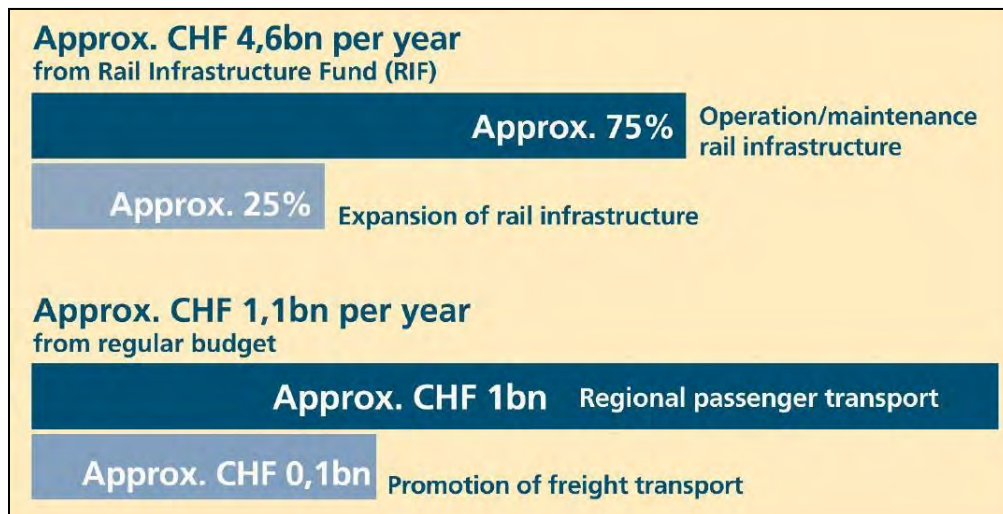


2022 Swiss federal budget composition (Source: Federal Office of Transportation)

At the federal level, transport financing is drawn from multiple sources with 50% going to the Rail Infrastructure Fund (RIF) and 12% to other passenger expenditures.

The FOT finances rail infrastructure as well as passenger and freight transport via the RIF and the Other Passenger Expenses. The following chart shows 2020 allocations of CHF 5.7 billion (~\$6.6 billion) in

transportation funds between operations and maintenance, expansion of rail infrastructure, regional transportation, and promotion of freight transport.

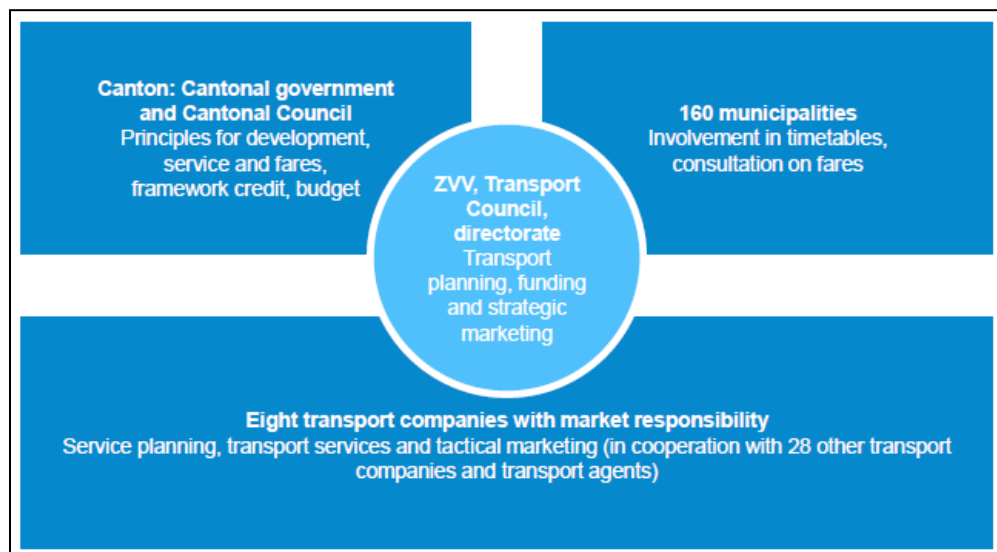


National budgeting for public transportation (Source: Federal Office of Transportation)

Cantons

Structure, Roles and Responsibilities

Switzerland's 26 cantons take the lead in planning regional transport services and are the central point of contact for the Confederation. They take part in the iterative planning process and together with FOT, guide transport undertakings in drawing up service and infrastructure plans.



Relationship of cantonal government, municipalities, ZVV, and transport companies (Source: ZVV)

The canton of Zurich is made up of 160 municipalities with 1.6 million residents. The canton coordinates with 8 transport companies with 'market responsibility' meaning they take responsibility over service in key sub-areas of the Zurich canton, sometimes contracting with other operators.

ZVV

The Zurich Transport Network (ZVV) manages transport planning, funding, and strategic marketing at the Cantonal government level. It is responsible for the tariff network, funding, timetable, infrastructure and operations. ZVV acts both at the cantonal scale and as the tariff unit. The ZVV board includes representation from the canton, municipal government, and from local municipalities, and SBB.

ZVV's authority and mandate to coordinate transit is established in legislation; the specific government code translates approximately as follows:

The purpose of the law is to make the cantonal area accessible with efficient transport on economic principles.

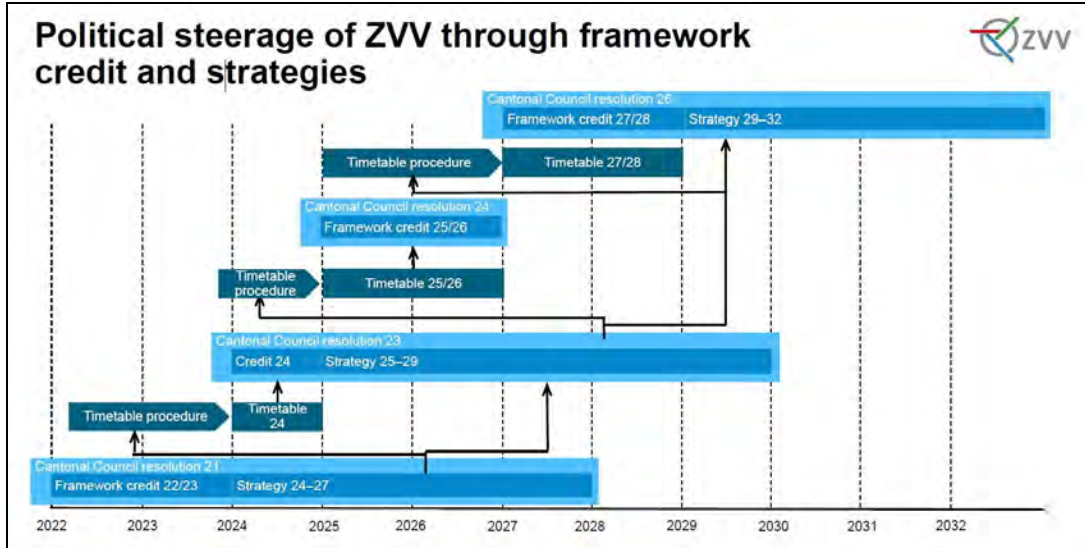
The state forms an integrated public transport network from the public transport operators in the canton.

The ZVV is tasked with providing an attractive public transport system operated on economic principles. This includes uniform network tariffs.

Long-Range Regional Service Planning

One of ZVV's key roles is leading a coordinated regional process of updating timetables with the 37 operators in the Zurich region in order to continuously improve transit service in the region, and in a way that is consistent with service goals identified at the federal level. This process occurs every two years and involves adopting a coordinated detailed timetable for the next two years, and a four year 'strategy' for the following years. In order to implement the adopted timetable for the next two years, transit operators are issued a 'framework credit' - the primary funding allocation that obligates them to deliver the service as agreed. The framework credit establishes the service level that the canton and municipalities will contribute to fund (see below).

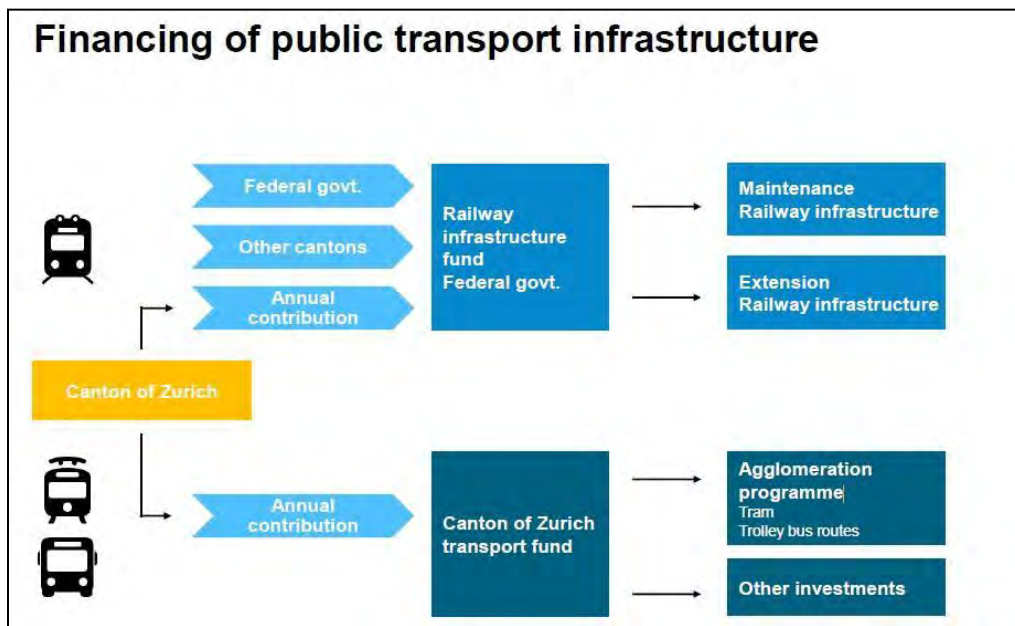
Every two years, when the process repeats, the prior cycle's 'four year strategy' becomes the basis for the near term two-year timetable update, creating continuity from cycle to cycle, and helping establish predictability of both service levels and revenues required.



Relationship of cantonal government, municipalities, ZVV, and transport companies (Source: ZVV)

The long-term planning and buy-in ensures political support and detaches the investment in transit service from day-to-day politics.

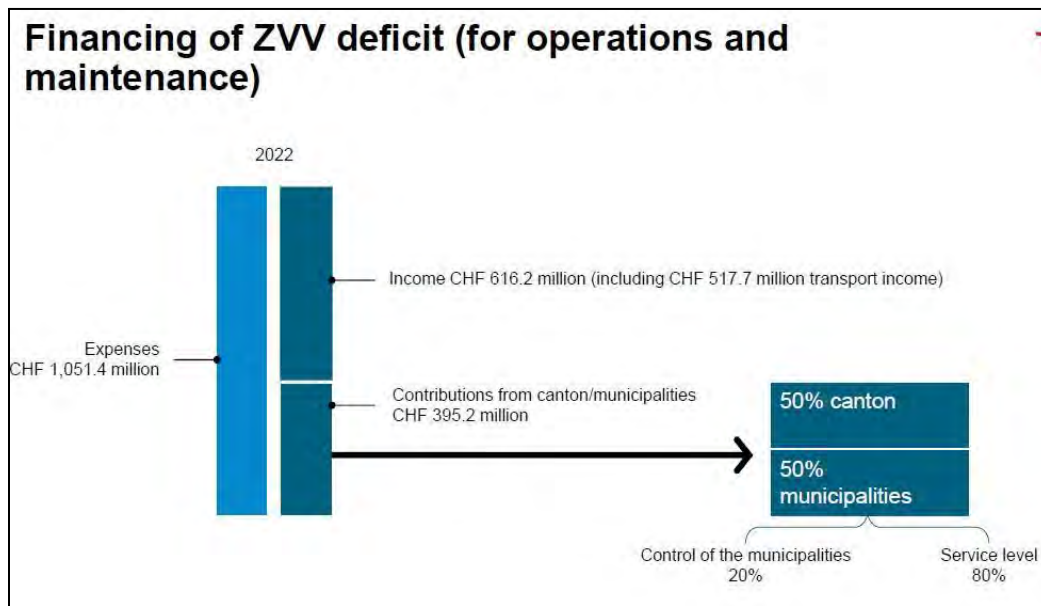
Operations Funding



Transportation capital infrastructure sources in Zurich canton (Source: ZVV)

Within the ZVV area, approximately 50% of operations and maintenance are financed by fare revenue; a further 10% is generated from other income such as advertising, third party contributions, and for additive services fully paid for by local communities. The other 40% is established by the 'framework credit', financed 50/50 by the canton and municipalities. For all services in the ZVV area other than the

S-Bahn, ZVV receives all income and finances all expenses of transport companies so economic risk related to ticket sales is not borne by the transport companies.



Transport operations funding sources in Zurich canton (Source: ZVV)

Capital Planning & Funding

ZVV also leads an iterative infrastructure planning and development process with local operators in order to meet forecast demand. ZVV supports project development and delivery, stakeholder engagement, and securing funding via public vote for major capital and infrastructure improvements to the tramway and bus networks in the canton (rail infrastructure is paid for by the IRF). See the “Infrastructure Planning” section for more.

Cities/Municipalities

There are over 2,000 municipalities in Switzerland.

Structure, Roles and Responsibilities

Example: City of Zurich

Cities are responsible for local policies and planning, and in some cases cities run and govern specific transit agencies. For example VBZ, the largest operator in the Zurich region, is a department of the City of Zurich. As with all other operators, VBZ must operate service within the rules set by ZVV, and more broadly, the national government, FOT. In the City of Zurich, growth drives planning to ensure adequate housing and mobility options. Key transit supportive policies at the city level include further densification of housing, planning the cycle priority network, setting speed limits, and managing parking. A key parking policy has been the capping of parking in the city at 1990 levels, replacing street parking in much of the city with underground garages at the edge of urban areas.

Funding

As shown above, municipalities in the Zurich Canton contribute 50% towards the operating need that is unfunded through revenues.

Transit Operators

Structure, Roles and Responsibilities

There are 270 operators in Switzerland, including 60 rail operators of which SBB is the largest. Operators are experts that develop local service plans to meet regional goals, including service targets. This is an iterative process with the regional planning offices, and also identifies necessary infrastructure improvements needed to implement the service plans.

The Confederation licenses operators and defines obligations in addition to transport services, including:

- Timetabling: Joint publication of timetables
- Information: providing (standardized) information to customers
- Participation on “Direct service” integrated ticketing and fare system
- Non-profit-principle for subsidized operators in (inter)regional and local transport service
- Competition: A passenger transport company must not set at risk existing offers of other transport companies.
- Numerous other standards, including safety, technological standardization, labor legislation, etc.

Operators also cooperate amongst each other on a range of efforts, including e-timetable, control center, advertising, and security.

SBB, the national rail authority, plays an outsized role in the network. SBB directly operates about 90% of all regional trains in Switzerland. SBB has over 34,000 employees, including over 15,000 in its passenger rail division. SBB acts as the ‘landlord’ of most rail infrastructure nationwide - it builds and maintains rail infrastructure for all operators and sells rights to operators to use tracks at certain times and along certain routes. It also heavily collaborates with most other transport companies of the country, such as the [BLS](#).

SBB used to be a government institution, but since 1999 it has been a special stock corporation whose shares are held by the Swiss Confederation and the Swiss cantons. It has an appointed board of directors which is confirmed by the Swiss Government.

Finally, PostAuto is another subsidiary company, wholly owned by Swiss Post, that operates a national network of regional buses, PostBus, that serve outlying lower-density areas that would otherwise lack transit service. Fares, schedules, and ticketing of PostBus are aligned to ‘extend’ the reach of the rail system, enabled by the Direct Service system overseen by SBB and Alliance Swisspass.

The Association of Public Transport Companies

VÖV/UTP (Verband Öffentlicher Verkehr/Union de Transports Publics) is the umbrella organization of public transport companies in Switzerland and includes 130 full members representing railway

companies, bus companies, funiculars/cableways/boats as well as 180 friendly members representing industry and business enterprises, associations and educational institutions.

The organization represents the interests of public transportation and rail freight as well as supports cooperation of members and exchange of information, advances standardization and manages the portfolio of education/training in public transport.

Direct Democracy

Funding for specific projects are brought to voters by referendum and require a 50% support to pass. Voting happens multiple times a year and is not typically dictated by other election cycles.

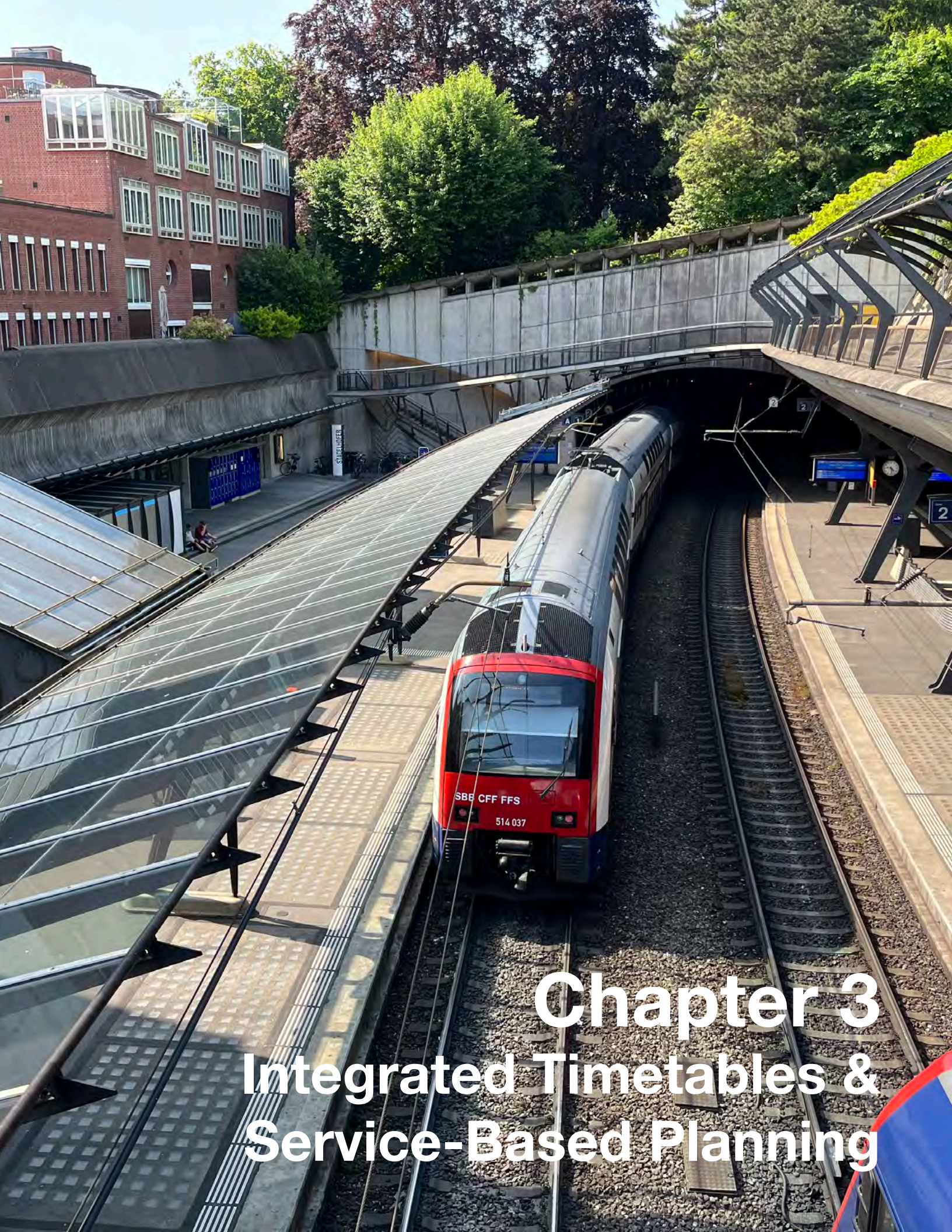


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Chapter 3

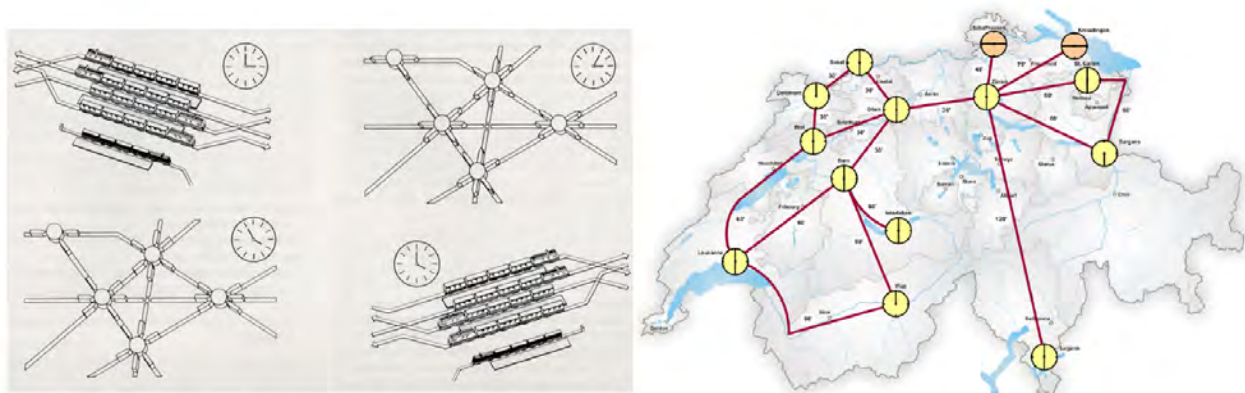
Integrated Timetables & Service-Based Planning

Chapter 3: Integrated Timetables & Service-Based Planning

Description of Practice

The rail system is the backbone of the public transportation network in Switzerland. In 1898, Swiss voters approved the nationalization of railways, putting the control of the country's rail network in the hands of the people. The system covers over 3,300 miles with 1,950 stations, and is 100% electrified.

Planning at the national level starts with the federally-mandated “integrated timetable” and node system, which utilizes a standardized, clock-faced schedule to provide seamless connections between rail services. Also known as a “pulse” schedule, train departures from each major city, or “node,” are aligned so that customers can easily transfer from one line to the next within a few minutes, minimizing wait times and providing the maximum number of travel options. With over a dozen such nodes, scheduling these services is a complex and intricate task requiring years of planning and at least two major infrastructure requirements. The first is that each node must have enough track and platform space to accommodate multiple trains to berth simultaneously, so that customers can transfer to a number of different trains at once. This requires a large station footprint, since at least 4 and in some cases more than 6 trains must have space to board at once. Secondly, travel time between nodes must be standardized to accommodate even and frequent headways on all lines and ensure transfers can be aligned. For example, travel time between Zurich and Bern needs to be an hour to provide seamless connections to other services from those two cities. This also results in the principle that trains must go “as fast as necessary, not as possible,” meaning that because of the importance that timed transfers have to network stability, node-to-node travel time does not need to be minimized if it already works within the national clock-faced schedule.



*Diagram illustrating concept of timed connections guiding Switzerland's service planning and station design
(Source: Marionna Lutz, Federal Office of Transport, May 30th, 2023)*

Travel time requirements drive the long term infrastructure investment needs for the country. The first public integrated timetable was first developed in 1982, leading to several national referendums resulting in massive infrastructure investment, including the “Rail 2000” plan passed in 1987 and the New Rail Link through the Alps (NRLA) passed in 1992. Incredibly, the Swiss government is currently developing their service plan for 2035, taking into account development projections and forecasted travel patterns (including a slight decrease in commuting traffic resulting from the COVID-19 pandemic that has been

outweighed by a dramatic increase in leisure travel). The service planning process includes setting frequency standards throughout the network, with the goal of increasing public transit mode share to 24% by 2050 (currently it is 21%). This also includes consulting with the 60 rail operators who provide input on both infrastructure and rolling stock requirements and conduct community and customer outreach to determine the level of service that should be provided. This process culminates in a complete package of construction projects necessary to achieve the service vision that is taken to the voters for approval, which is the subject of the next chapter.

The pulse schedule operated by the national railways benefits the local transit operators by making it easier to align the schedules with the connecting services. Once the initial S-Bahn regional rail network opened in 1990, Zurich's public transportation company, VBZ, strove to orient local tram and bus lines to feed the longer-distance trains. This coincided with the organization's own service improvement strategies that had been under development since 1973, which included dedicating lanes of traffic to transit vehicles, providing them with priority over automobiles at crossings and intersections, and managing transit lines from a centralized Control Center. This has led to benefits of reduced travel time for customers, higher on time performance, lower costs, and increased public transit ridership.

Key Takeaways: Integrated Timetables and Service-Based Planning

Significance

Integrating transit schedules to provide seamless transfers between routes is a well-established best practice in the transportation industry, because it allows transportation providers to provide the maximum number of trip origin-destination combinations at the lowest cost without negatively impacting the customer's end-to-end travel time.

Customer benefits

The pulse schedule, which features clock-faced departures from major terminals, provides customers with a standardized, repeatable schedule that is easy to understand and remember, and generally offers frequent service throughout the day and on weekends, providing significant flexibility and reliability.

Outcomes

The outcome of this practice is that not only does the national rail system have a standardized schedule with easy transfers between routes, but all the connecting transit providers (bus, light rail, funicular, ferry) are able to align their own schedules to line up with the longer-distance rail services, providing an opportunity for even headways across all modes. With simple, repeating schedules throughout the day and seamless transfers between services, customers are more likely to rely on public transportation for a variety of trips (not just for work purposes, but also leisure and discretionary travel). The result is an increase in system ridership, generating a positive public perception of the value of the system, leading to more public and political support for investment

in infrastructure improvements, which makes the system more efficient and reliable. This “virtuous cycle” is the opposite of the transit death spiral that our country currently faces.

Comparable Bay Area Practice

The California State Rail Plan specifically references the Swiss Rail Network as the basis for Caltrans’ long term vision of a high-frequency, interconnected regional rail system in all of California. However, the infrastructure investment required to achieve this vision is extremely costly and difficult given that the vast majority of the rail network is still owned by private freight companies. It will require significant government intervention to negotiate greater use of privately owned railroads for passenger use; otherwise, the likelihood of a full-scale implementation of a statewide integrated timetable in California within this century is low.

The Bay Area’s Connected Network Plan plan currently underway has the potential to provide the service vision for Bay Area transit to guide the Bay Area’s future transit investments.



Chapter 4

Infrastructure Planning

Chapter 4: Infrastructure Planning

Description of Practice

The majority of public transport infrastructure in Switzerland has existed for decades, and has benefited from ongoing planning and investment over time. The country's extensive rail network was entirely electrified over 60 years ago. However, the need for rail and tram (i.e. light rail) expansion exists as the Swiss population continues to grow, the demand for public transport increases and the use of private automobiles decreases. As a result, despite its comprehensive existing public transport network, Switzerland has the second highest level of investment in public transport per capita in Europe.

There are continually major rail infrastructure projects in the pipeline to improve efficiency, capacity and network expansion in order to keep up with growing demand. One of the more notable federal rail projects was the construction of the Gotthard Base Tunnel through the Alps – the longest rail tunnel in the world. The tunnel opened in 2016, took 17 years to complete and decreased travel time by 45 minutes.

At the local level, two tram projects are expected to be constructed per decade in Zurich to keep up with urban growth as the city extends outward. Compared to American standards, these infrastructure projects are developed and completed at a tremendous pace and at significantly lower cost per kilometer. Local public transport infrastructure projects are always integrated with development plans and include bicycle infrastructure.

Project Development

Project planning and development for public transport infrastructure occurs well before there is any commitment to construct the project. Through allocations of CHF 4 million (~\$4.6 million) per project specifically for planning and development, project owners (usually transit operators) develop projects up to the schematic design level, carrying risk that the project may never be completed. The planning and development stage includes significant coordination and partnership with all stakeholders, in addition to extensive public outreach in order to minimize that risk. In addition to outreach and coordination, this phase of the project development and planning could include: alternatives analysis, concept of operations, design development and right-of-way acquisition. Land acquisition and sometimes displacement are common in public transport infrastructure projects because land owners understand the greater benefits of the project and their property value will significantly increase as a result of the project.

Project Approval

Given all of these aspects, project planning, design and development can take seven to ten years to complete. At the conclusion of this phase, projects over \$20 million go to a referendum for the public to vote on whether or not the project should be completed. This direct democracy is a unique aspect of the Swiss government structure that ensures infrastructure projects, along with many other government initiatives, are implemented at the will of the people. The Swiss believe that major projects and initiatives

should not be decided by the government alone and should be approved by the people. Because the Swiss highly value public transport and initiatives pass with a simple majority vote, related infrastructure referendums typically advance. This project approval process ensures that projects advance for the greater good. In the rare case that a project does not pass, there is opportunity to refine and return to the ballot for another vote. This form of government structure requires a high level of government involvement since elections happen quarterly for public initiatives. Examples of projects and their approval process are listed under the Case Studies section below.

While this project implementation process carries risk, it is limited to the development phase because all of the major and controversial aspects of the project are resolved early in the process and ultimately decided through the public vote, which gives certainty to the project's completion. As a result, Swiss officials shared that public transport infrastructure projects are nearly always completed on time or ahead of schedule and at or below budget during the construction phase. This thorough planning process results in precise project cost estimations prior to referendum vote.

Funding

Funding for capital investments in public transport infrastructure come from a variety of sources from the federal, canton and local levels. At the federal level, Switzerland has a Federal Agglomeration Policy that lays out policy, programs, plans, strategies and tools with a focus on transportation and spatial development to help ensure sustainable development throughout the country. The policy also drives the distribution of infrastructure funding to the established agglomerations, resulting in the financing of public transport projects.

In addition to federal funding, there are also financial contributions at the canton level, as well as other local investments to fully fund public transport infrastructure needs. For regional or national rail projects, funding contributions come from multiple cantons.

Overall, funding for public transport infrastructure is prioritized at all levels of government and is consistent, resulting in continual investment in the country's network. Also, funding flows downward for investment in local projects but also flows upward to subsidize rail network improvements at the regional and federal level since the rail network is the backbone of the country's successful public transport system.

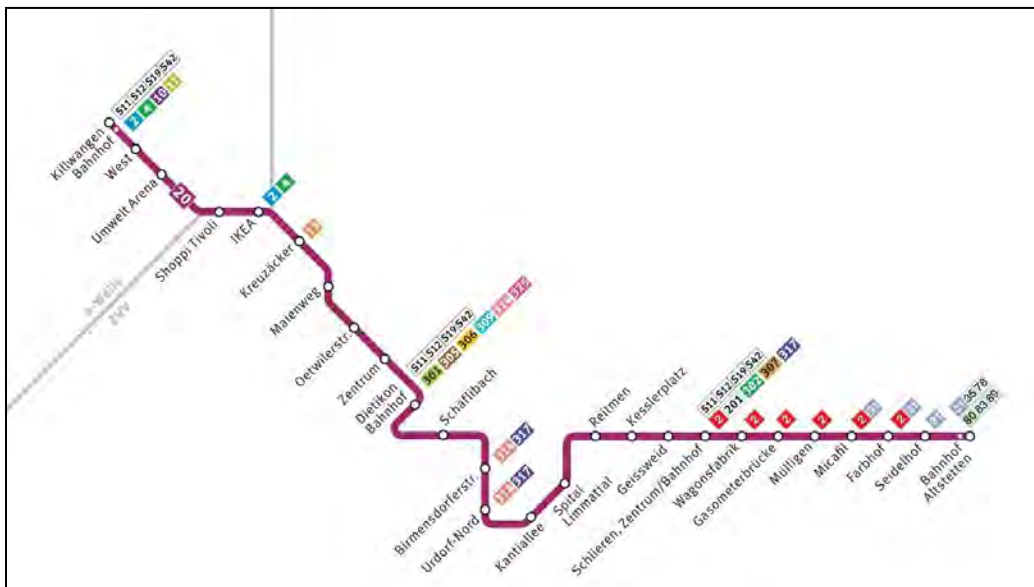
Case Studies

Below are two case studies of tram system extensions in and around Zurich to meet population and land-use growth, and overall increase in public transport demand. These projects were the result of strategic plans at the local and regional level that projected significant growth and ridership demand along these two corridors by 2030.

Limmatal Line

In the Limmat Valley, a corridor spanning Zurich and Aargau cantons, the [Limmattal light rail line](#) opened in December 2022 with the first section of the line opening in September 2019. Strategic corridor

planning began in 2000 and in the late 2000's, the project made its way through parliament approval of the affected cantons. Detailed project planning and design development began in 2010. The project made it to public referendum with an affirmative vote in November of 2015 after receiving 3,000 endorsement signatures in the Zurich canton.



Limmatal Line (Source: VBZ)

Tram Affoltern

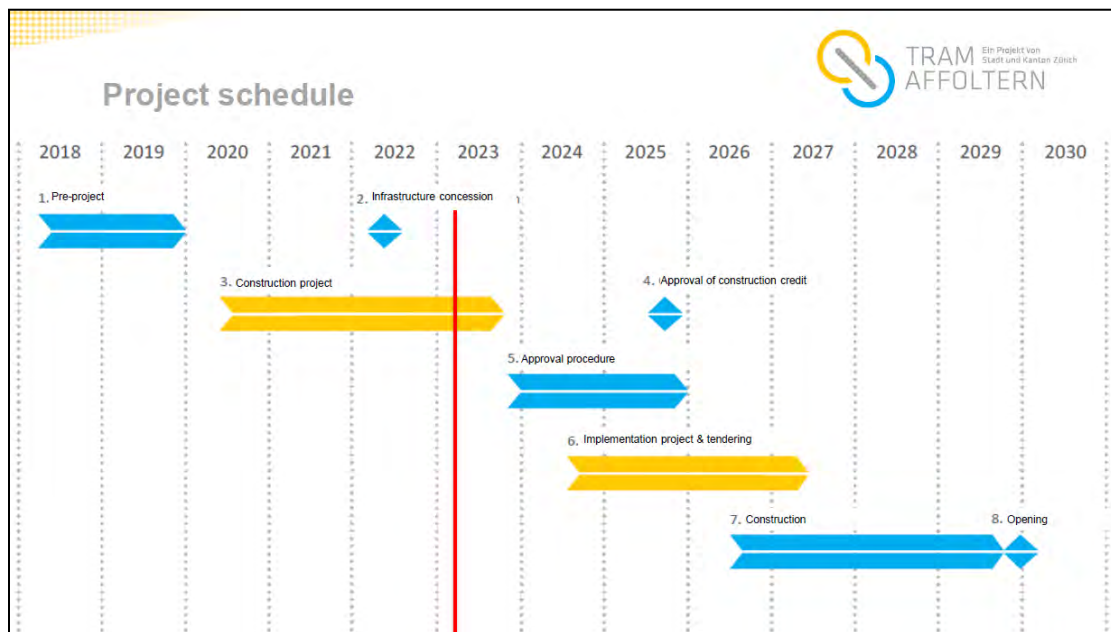
Currently in the planning phase is the [Tram Affoltern](#) project, an extension of tracks in [Zürich Affoltern](#) proposed due to significant population growth and activity, resulting in traffic congestion. Once

completed, the tram extension will be four kilometers long with eight new stations and if approved, is expected to open in 2029.

In addition to responding to growth and congestion, the Tram Affoltern project will also:

- Spark transit-oriented development
- Require a redistribution of right-of-way to not only accommodate trams as the modal priority but to also accommodate cyclists and pedestrians
- Acquire land and titles to complete the project, including the displacement of a popular restaurant.
 - o Negotiations with property owners occurred early in the process to identify technical solutions.
 - o Early and extensive outreach are critical to the project's success

The Tram Affoltern project is nearing the completion of planning and preliminary design with the project approval process starting in early 2024 and ending in late 2025.



Project timeline for Tram Affoltern (Source: VBZ)

Key Takeaways: Infrastructure Planning

Significance

The Swiss delivery of public infrastructure projects ultimately minimizes significant project risk and ensures a project with maximum benefit.

Infrastructure planning with the nation-wide service vision for the transit system based on the clock-face schedule. The clarity of the overarching clock-face schedule as the goal puts a

boundary around which projects are actually needed. If a project isn't needed to achieve the long-term time table and improve access, it is not prioritized.

The government's direct democracy that requires voter approval of infrastructure projects guarantees that a majority of the public wants the project built and that projects serve the greater good rather than just those immediately impacted (e.g. residents and business adjacent to a project corridor). In addition, since significant project development and design must occur before being voted on by the public, the risk of cost and schedule overruns is reduced.

Customer Benefit

This process has tremendous benefit to the customer because it allows for the public transport network to be expanded and updated to best serve the greater good and provide access to and from new development and where needed. This process is generally effective at filtering out watered down projects or projects with limited benefit since projects must align with the will of the public, resulting in effective new public transport. In addition, the construction schedule from the public vote to project completion is short relative to the entire project development and delivery process, meaning results and use of tax dollars are realized more quickly.

Outcomes

- Effective projects
- Efficient project delivery
- Efficient use of taxpayer dollars
- Constant improvement of the already comprehensive public transport network because it is what the public values and prioritizes

Comparable Bay Area Practice

While the development and delivery of public transit infrastructure projects in the Bay Area have some similar aspects, there are some key differences that contribute to the successful implementation of projects in Switzerland. These include:

- Decisions on funding and approval of projects in the United States are often made by elected representatives rather than directly by the public. These decisions are made at multiple levels and across multiple jurisdictions, often with different and inconsistent outcomes due to competing interests.
- In the Bay Area, projects with only a conceptual level of design are regularly included in project lists voters are asked to endorse. Once projects have been included on project lists, this creates political pressure and public expectation that a project will get built, even if, as the project design process continues, the cost increases and relative value of the project becomes questionable. The responsibility to fund project planning and development at the local level as well as competition for discretionary funding creates

incentives for project sponsors to minimize estimates of cost and risk, making it difficult to “walk away” from projects.

- Switzerland demonstrates greater prioritization at all levels of government and with the public as a whole to continually improve public transport; The Bay Area lacks consistent funding for capital projects - and is dependent on federal and state budgets that change regularly, and local taxes
- The U.S. and Swiss federal governments (through the Federal Transit Administration and the Federal Office of Transport, respectively) each play a similar role in providing a significant share of the cost for major capital projects
- MTC is the equivalent of ZVV for planning, programming and funding allocation; yet MTC does not have a highly involved role in project planning and delivery the way ZVV does.

Kilchberg

Zürich Bürkliplatz

Thalwil
Erlenbach

Rapperswil
Schmerikon



An information board featuring a map of the lake area, a schedule of ferry services, and other relevant details for passengers.



Two large informational panels, likely providing detailed maps or schedules for the ferry routes.





Chapter 5

Fare Integration: “One Journey, One Ticket”

Chapter 5: Fare Integration - “One Journey, One Ticket”

Description of Practice

Public transit in Switzerland, which is run by 260 different operators, has highly integrated transit fares. As a result, riders are able to purchase tickets and passes that are valid across all operators, experiencing the principle of ‘one-journey, one ticket’, no matter where they go.

For any journey between any two points taken on transit in the country, the rider pays only once. The price to go between point A and point B is the same for any combination of modes or operators - a direct bus, a train-bus transfer, a ferry-bus-train transfer, etc. The price a user pays is approximately proportional to the distance traveled - or for a trip within a single canton, the price is based on the number of ‘zones’ traversed.

The rider can also purchase any ticket for any journey from any outlet where tickets are sold, including any ticket vending machine, ticket-vending counter, or mobile ticketing app.

Riders also have access to a common range of special transit passes that provide discounts for the entire regional or national network, and which incentivize transit use. Most riders have a “SwissPass” account, the nationally administered payment system through which they can purchase special passes and tickets, which then can be used with a physical card mobile device. 53% of Swiss pay US \$200/year for the ‘Half Fare Travelcard”, a pass that entitles them to half-price fares for the entire year across all operators in the country. Other passes, like regional passes (for one canton only), are also available.

Finally mobile ticketing has taken off in recent years; as of 2022, 64% of all tickets sold in the ZVV region are on digital channels, compared to just 22% in 2017. Mobile ticketing has created new payment options like, ‘post-trip payment’, enabled through apps like Fairtiq, where a rider simply ‘swipes on’ when they board, and ‘swipes off’ when they alight - the fare is calculated and charged automatically, and any passes or discounts are automatically applied.

National Regulations on Public Transit Ticketing

The practice of fare integration is carried out at two levels: at the national level, overseen by an agency called Alliance SwissPass; and at the cantonal level, overseen by one the cantonal fare associations, such as ZVV in the Zurich region. Cantons in Switzerland are most analogous, in terms of population and area, to Bay Area counties.

The national regulations applicable to ticketing include:

- **Open access to public transport.** National law dictates that fare gates are not allowed.
- **No obligatory reservations.** Riders can simply show up and ride, as long as there is space.
- **No restrictions on time of travel.** Tickets cannot be restricted by time.

Nationwide, a significant share of all funding for public transit comes from fares; the ZVV region enjoys about a 50% farebox recovery level. No part of Switzerland offers free fares.

Alliance SwissPass

Alliance SwissPass is the national organization that oversees a distance-based fare structure and other national coordinated fare and ticketing-related policies and joint activities.

Alliance SwissPass's responsibilities include:

- Deciding upon product range (like half-fare travel cards), price and fare conditions at national level
- Marketing the national range of products
- Administration and development of the shared IT system
- Maintaining a national register of passengers traveling without valid ticket (i.e fare evaders)
- Responsibility for revenues, cost allocation and accounting
- Providing customer service; remuneration for consulting services

Alliance SwissPass collects all fare revenues for tickets and passes purchased through their account based system, and allocates funds back to operators based on complex formulas negotiated among operators. The rider doesn't see the complexity, but instead just sees a single price that corresponds to their trip and is roughly proportional to the distance traveled. Because of the lack of fare gates, exact data on every single passenger is often not available to determine revenue allocation. Instead, the Alliance Swisspass regularly conducts detailed surveys about rider travel behavior to determine the exact allocation of revenue for products like one-day passes and half fare travel cards back to riders.

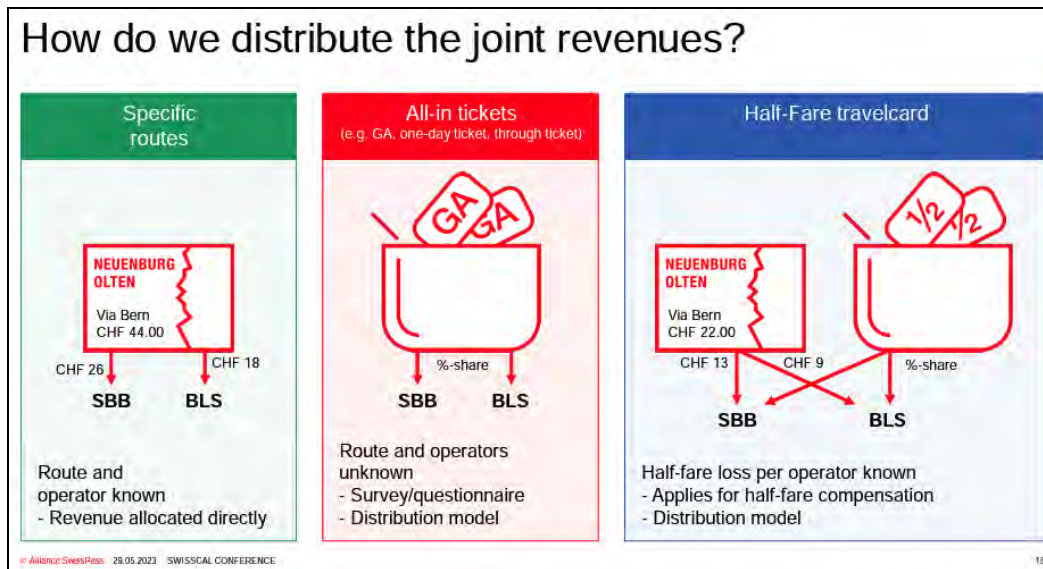


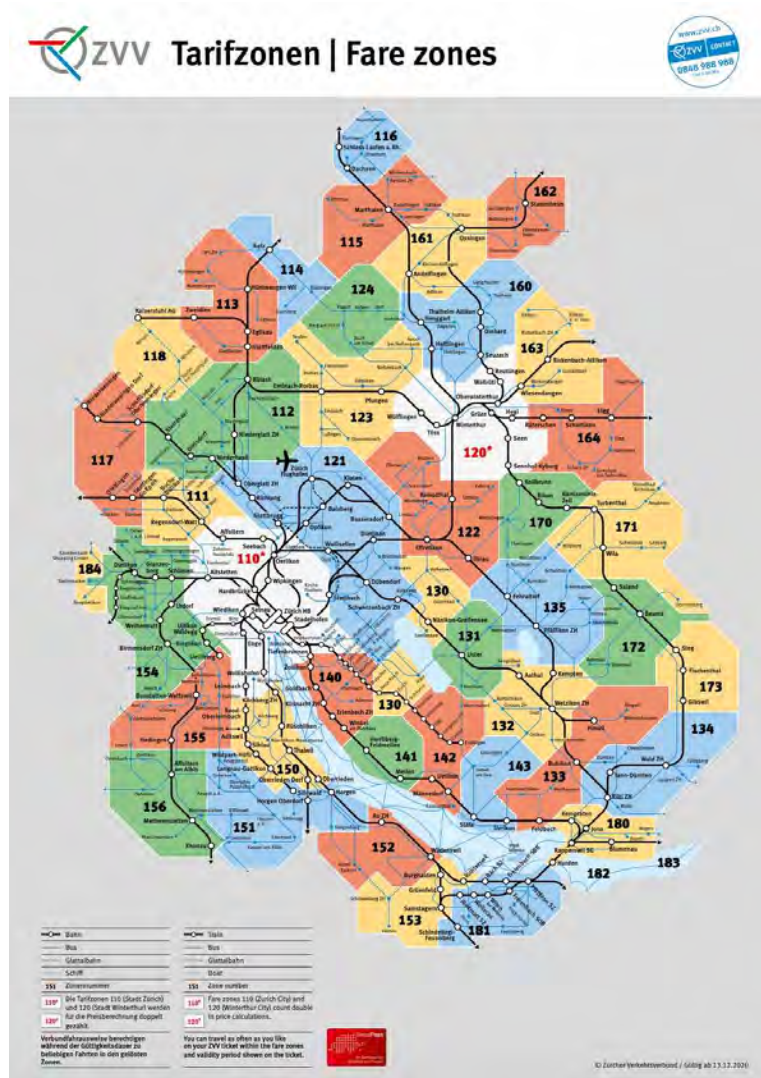
Illustration of how fare revenue is distributed among operators (Source: Alliance SwissPass)

Alliance SwissPass also manages the back-end-systems associated with ticketing for all operators in the country, including the common NOVA database, ensuring consistency in user interface for customers, and availability of all ticket products at all sales outlets.

Alliance SwissPass is a quasi-public entity, described as “as an impartial organization for the public transport industry”. It is governed by its member organizations, which include 250 public transit operators and 18 cantonal fare associations. However, membership in Alliance SwissPass isn’t optional - membership is mandatory for any agency receiving public funds. Further, Alliance SwissPass is obligated to the policies that are identified in national regulations - so they are tasked with figuring out *how* to offer fare unified fares, not whether to do it at all.

Regional Fare Associations

Integration of fares within cantons - regional and local travel - is subject to federal rules and practices established by Alliance SwissPass and, but managed by regional fare associations like ZVV for the Zurich region (37 operators, 1.6 million in population) or Libero in the Bern region (28 operators, 1 million in population). As a result, there are differences in fare structures between each canton, particularly for local fares.



ZVV's zone-based fare structure determines fares for all 37 operators in Zurich canton

All regional fare structures the delegation saw were zone-based systems. ZVV's zone based fare system was established in 1990 in connection with the opening of the S-Bahn system. A unified fare structure for the region was a central promise of the 1981 ballot initiative that funded the S-Bahn, and confirmed via the creation of ZVV in a 1988 ballot proposition for which the slogan was "One ticket for the entire canton". ZVV's authority to establish a unified fare system is established in legislation of the Public Passenger Transport Act: "§11 The ZVV is tasked with providing an attractive public transport system operated on economic principles. This includes uniform network tariffs."



Opening day of the S-Bahn in Zurich authorized by the ballot measure that also called for the creation of ZVV integrated fares; a "yes" flyer for the ballot measure uses the slogan "One ticket for the whole canton" (Source: ZVV)

ZVV collects all fare revenue for all the 37 operators within its region; it also finances all expenses of transit companies in the region; as a result, funding is distributed back to transit agencies based on service contracts. Because transport companies do not collect any of their fare revenue directly, they do not carry any financial risk associated with ridership - they must simply operate service according to agreed upon standards established through agreements with ZVV.

Key Takeaways: Integrated Fares

Significance

Throughout the delegation visit, fare integration was cited by Swiss experts from all levels of government - from the federal government to local operators - as essential to the success and attractiveness of the system. Ridership increased significantly from 1990 to present on ZVV, which coincided with both the opening of Zurich's S-Bahn system and the system of integrated fares, so it is difficult to disaggregate the impact of these two factors.

The specific way fare integration occurs in Switzerland is notable because of the large number of agencies - 260 nation-wide - and the various complicated funding arrangements that occur behind

the scenes. Municipalities and local authorities make significant contributions to the costs of running service, yet that local funding does not prevent them from offering common products for passengers. For example, within the ZVV region, approximately 50% of revenue is from fares; of the remaining revenue, approximately 40% is contributed by individual municipalities, who directly participate in the planning and prioritizing of service levels through the structures and processes administered by ZVV. The existence of local funding contributions does not inhibit individual operators from participating in the regional unified fare structure.

Customer Benefits & Outcomes

- Simplicity for the user - riders can purchase any ticket or product through any payment outlet - on any mobile app, any ticket machine.
- Popularity of pass products: 53% of the population purchases a yearly pass (half-fare card)
- Riders pay only once, and don't have to worry about what combination of modes they take; riders are not financially disincentivized to make transfers.
- SwissPass is an important means for promoting promotions with transit, for example selling joint ski passes with a transit pass, or co-promotions with external entities.

Comparable Bay Area Practice

Like SwissPass, Clipper is the Bay Area's fare payment system, in use by most of the region's agencies, and managed by the Clipper Executive Board through a memorandum of understanding. While Clipper enables different fare promotions and passes, most of these are developed on an agency-by-agency basis - discounts and transfer policies depend on each specific agency. Clipper is transitioning to an account-based system from a card based system in late 2024 with the upgrade to Clipper 2.0. MTC administers Clipper, though doesn't attach any common fare policy requirements to the Clipper system.

Integrated fare products are currently being piloted with most funding being provided by MTC, mostly protecting agencies from risk of lost fare revenue. Still, unlike Switzerland, participation in integrated fare policies is voluntary and subject to each individual agency choosing to opt-in. The BayPass, a multi-agency transit pass pilot project, is showing promising ridership results. Free and reduced priced transfers are planned on a pilot basis with the launch of Clipper 2.0, but implementation of this policy is dependent on approval by each agency board. Rollout of the BayPass program beyond the pilot phase is also subject to negotiation and approval by each agency board. A common distance-based structure for regional services - like Switzerland's national common-distance based structure - was recommended by the fare integration study, however there is currently no timeline for implementation of such a structure, or clarity on how such a structure would be set up or governed.

Nach	Gleis	Hinweis
S1 09:15 Europaplatz Flamatt Fribourg/Freiburg	1 E-H	
S7 09:15 Worblaufen Papiermühle Worb Dorf	24	
S1 09:16 Wankdorf Ostermündigen Thun	10	
S31 09:16 Wankdorf Zollikofen Münchenbuchsee	12 A-C	
S9 09:16 Felsenau Tiefenau Unterzollikofen	22	
S31 09:17 Europaplatz Weissenbühl Wabern Belp	4	
S51 09:19 Stöckacker Bern Brünen Westside	12 D-F	
S2 09:20 Europaplatz Flamatt Laupen BE	1 A-D	
S4 09:20 Wankdorf Burgdorf Langnau i.E.	13 AB	
RE 09:20 Jegenstorf Bätterkinden Solothurn	21	
S8 09:24 Worblaufen Oberzollikofen Jegenstorf	23	
S3 09:30 Wankdorf Zollikofen Lyss Biel/Bienne	10	
S7 09:30 Worblaufen Papiermühle Worb Dorf	24	

Vorinformation Bauarbeiten: Fahrplanänderung Bern - Olten (Basel / Zürich / Luzern).
Dauer: Fr, 02. Juni ab 21.00 Uhr bis Mo, 05. Juni 2023 um 05.55 Uhr. Prüfen Sie Ihre
Verbindung im Online-Fahrplan.

Nach	Gleis	Hinw
S9 09:31 Felsenau Tiefenau Unterzollikofen	22	
IC 1 09:31 Zürich HB Zürich → St. Gallen	6	
S3 09:32 Europaplatz Weissenbühl Wabern Belp	1 A-D	
IR 16 09:33 Olten Aarau Brugg Baden Zürich HB	12	
S52 09:34 Stöckacker Bümpliz Nord Kerzers	13 D-F	
IC 1 09:34 Lausanne Genève-Aéroport →	3	
IC 6 09:34 Thun Spiez Visp Brig Domodossola (I)	5	
RE 09:35 Jegenstorf Fraubrunnen Solothurn	21	
S6 09:36 Europaplatz Liebfeld Schwarzenburg	13 AB	
RE 09:36 Konolfingen Langnau Wolhusen Luzern	2 A-D	
IC 61 09:36 Olten Basel SBB	4	
IR 35 09:38 Burgdorf Olten Zürich HB Chur	50	
S8 09:39 Worblaufen Jegenstorf Bätterkinden	23	
RE 09:39 Münsingen Thun Spiez Frutigen Brig	9 A-E	
RE 09:39 Münsingen Thun Spiez Zweisimmen	9 FG	
S4 09:42 Belp Toffen Kaufdorf Thurnen Thun	3	



Chapter 6

Conclusion & Lessons Learned

Chapter 6: Conclusions & Lessons Learned

While Switzerland and the Bay Area have many differences, many important lessons can be drawn from the success of Swiss public transit. The following are ten specific lessons that the US participants in the delegation to Switzerland view as relevant to Bay Area transportation agencies and policymakers:

Focus on the customer, and recognize varied travel needs

During the delegation visit, Swiss officials from all levels of government - from the federal government to local operators - emphasized the importance of 'focusing on the customer' to guide decision-making. Part of this is a recognition that most customers use a *variety* of different transit services. Officials never referred to 'bus riders' and 'rail riders' and 'vacationers' as different groups of people. Rather they spoke about customers as having varying needs depending on the situation - needing transit for local travel on one day, regional travel on a different day, and for recreation on other days.

This acknowledgement that the typical transit rider will need to use various kinds of services, often provided by different agencies, means that putting the 'customer first' cannot be separated from following a consistent, unified, approach. Focusing on the customer means following the same standards as other operators in the region and even country - participating in the unified fare structure; aligning schedule and route planning to maintain the pulsed timetable system; following common wayfinding standards; utilizing the centralized customer information call center.

Focusing on the customer also extended to establishing the necessary centralized staff capacity for more customer-focused decision-making and tracking customer satisfaction. SBB funds a user experience department of at least 20 staff dedicated to improving the customer experience for regional travel, and identifying key pain points in the customer journey. ZVV administers the region's regular region-wide customer satisfaction survey, which is used to ensure operating companies in the region maintain high quality service.

Successful collaboration between region and operators is built on clear role definition

Swiss officials stressed the importance of collaboration between levels of government, and acknowledged that at times it can be difficult to balance local, regional, and federal goals. US Delegation attendees observed that, especially in comparison to the Bay Area, clear role definition between the various levels of government is an important component to the success and resilience of the Swiss system.

For example, every two years, ZVV leads a coordinated regional process of updating timetables with the 37 operators in the Zurich region. ZVV has the explicit mandate to do this in its statute, and operators in the ZVV are obligated to be part of it. ZVV establishes overall regional goals for changes to service - some of which may originate from the federal government - and then it oversees a structured process, in partnership with operators, to determine the updated timetable for the region that balances network goals with local needs. VBZ and ZVV officials shared that this can sometimes involve difficult

negotiations and compromises, and can even get political. Ultimately, however, the partners remain committed to the process because it is recognized that offering a coordinated, networked system is in the best interest of the customer, and has been an essential component of the enduring popularity and high ridership of the system.

The Swiss system demonstrates a method of achieving a middle ground between 'top down' and 'bottom up' planning that balances the importance of common regional standards and goals while providing opportunities for local know-how and innovation to be responsive to local needs.

Treat transfers as the 'base case', not the 'edge case'

The Swiss pulsed timetable system is planned so that transfers are as quick and reliable as possible, its fare system is structured such that there is no financial penalty to transferring, and stations are built to maximize the physical convenience of transfers. Because of this and plentiful, frequent service, transfers are painless and widespread. Nearly every trip on transit the delegation took involved one or more transfers, often between agencies -- usually a local leg and a regional leg -- yet the delegation never waited more than a couple of minutes, and never had to walk very far to make the transfer.

This approach differs significantly from how transfers are often treated in the US - as an exceptional occurrence or 'edge case'. The difference in these approaches has an impact on network design and service planning. In the Bay Area, Clipper data shows that only 8% of trips involve inter-agency transfers. The large number of transfers in Switzerland indicates that there could be a lot more transfers occurring in the Bay Area if the network was designed to facilitate them, not only with coordinated timetables, but with coordinated route planning, integrated multi-modal station facilities, and fare policies that don't create a financial penalty for transfers.

Give street level public transit priority over private vehicles

1973, Zurich region voters famously rejected a proposal for expensive underground metro (U-Bahn) systems that would have put rapid transit underground. A response to the failed ballot measure was both the development of the S-Bahn regional rail system that makes up the Zurich region's regional transit backbone network, and also a renewed focus on enhancing the performance of Zurich's extensive tram (streetcar) network. The "Zurich Model" of urban transport that was implemented following the failed ballot measure includes giving surface transit vehicles dedicated lanes, providing signal priority to transit vehicles at crossings, and managing the network centrally from a control center. Zurich also introduced policies that discouraged driving in urban areas, including building parking garages at the periphery of the urban core, removing street parking, and promoting transit-oriented development. Today, Zurich's tram network, primarily run by VBZ, is the backbone of the city's extremely high ridership, carrying over 64% of all commute trips.

The Zurich model demonstrates that surface, street-running rail transit can be fast and reliable if transit is given appropriate priority and over private vehicles, and if service is plentiful and frequent.


 Ein Projekt von
 Stadt und Kanton Zürich

After 1973: The «Zurich Model»



Separate lanes for PT



Priority on crossings



Management by centralised Control Center

Results:

- Reduced travel time
- Higher punctuality
- Lower costs
- Increased PT ridership

5

The “Zurich model” of public transit (Source: VBZ)

High service levels are essential, underpin the success of other strategies

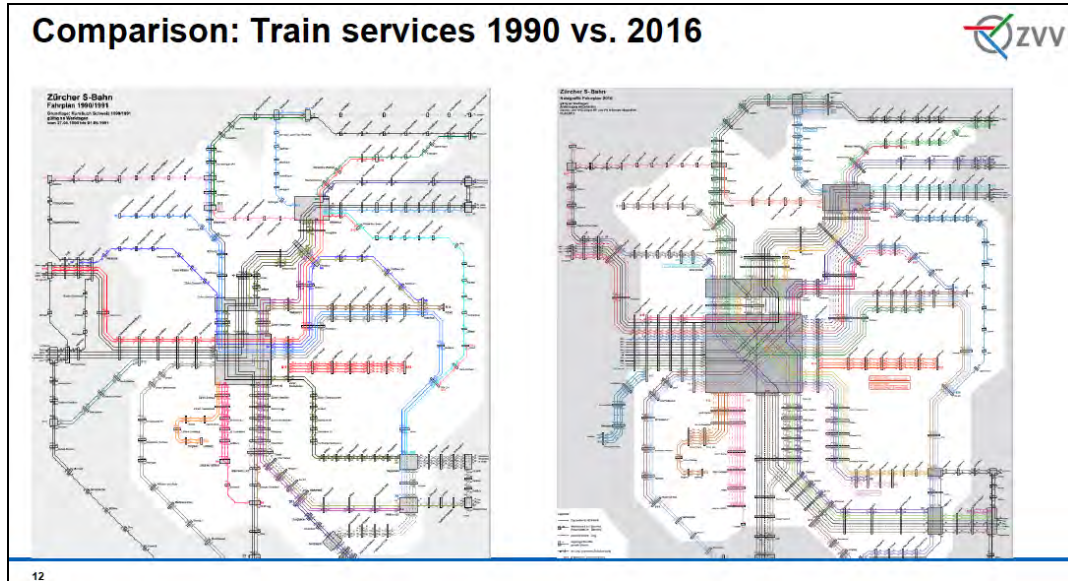
Essential to Switzerland’s high level of transit use is high levels of service, supported by significant sources of funding for operations as well as fares, which make up 50% of all operations funding in Zurich canton. It is estimated that the canton of Zurich runs approximately four times as much service as Santa Clara County, which has a similar population. Given that nearly all service is run at street level, transit is also highly visible throughout Zurich, especially in the city center.

Service is highly regular, running seven days a week, late into the evening, and all day long - not just at commute hours. While many corridors don’t always have frequent service - especially long-distance trains and buses which might only run once an hour or every 30 minutes - the timed connections and expensive span of service make these services appealing and reliable.

The delegation learned that increasing levels of service have been built up over time, with successive ballot measures authorizing further capital and operations investments that have enabled expansion of capacity and increasing of frequencies. Increasing frequencies, funded by these successful ballot measures, have been strongly correlated with attracting more passengers, contributing to the country’s high transit mode share.

Invest in capital & operations strategically based on a long range service vision

The Swiss transit system is planned around a clear vision for service - for the entire country, and at the cantonal (regional) scale - identifying target times between key hubs, and identifying the future timetable for service 20-30 years into the future that is needed. That long term service vision is used to identify all capital project investments needed - and operations funding needs to run that level of service.



*Network maps of Zurich's S-Bahn showing significant service expansion since opening in 1990
(Source: ZVV)*

This planning practice of starting with the end network in mind, and basing a capital and operating investment plan off of that end network, has enabled the Swiss to invest gradually and steadily in increasing service, capacity, and ridership. It has meant that ballot initiatives taken to voters can be associated with clear service goals; and that near term investments in capital and operations can be focused on the most cost-effective improvements that will benefit the network.

Without such an approach, there can be uneven investment in capital and operations, and capital investments may not be coordinated or optimized around a common network vision. A shared vision for service can help maximize the effectiveness of public investments in capital and operations.

Proceed with large capital projects once full costs and risks are known

One of the reasons cost overruns are rare in Switzerland is the aforementioned practice of having a clear service vision guiding capital project identification and design. As a project moves through project development and design phases, planners and engineers ensure the project is fulfilling its intended purpose as part of the overarching network vision.

The delegation learned that another key difference between project delivery in Switzerland and California is the amount of design that occurs prior to asking the voter to authorize major capital funds to a project. In California, projects with only a conceptual level of design are regularly included in project lists voters are asked to endorse. Once projects have been included on project lists, this creates political pressure and public expectation that a project will get built, even if, as the project design process continues, the cost increases and relative value of the project becomes questionable.

In Switzerland, significant project identification, development and design is done prior going to the voters or to the federal government for additional funding. Swiss officials shared that project

development and design can take a very long time - over ten years. Projects get put on a ballot for a public vote once alignments, construction methods have been identified - and risks have been accounted for and minimized. As a result, once the public votes to proceed with a project, construction often starts much sooner, and stays within the budget identified.

Public ownership of rail & transit right of way is important

While it can't be easily replicated, it is important to acknowledge that Swiss success in planning for integrated, quality rail is greatly enabled by Swiss public ownership of all railway infrastructure - something that occurred in 1898. While the Bay Area and California has a significant amount of rail infrastructure, much of it is privately owned by freight railway companies, and much of that is not maximized for public benefit. Significant potential could be unlocked if more existing rail infrastructure was within public ownership. Bay Area transit agencies and the region would likely benefit from working together strategically with the state to advance greater public ownership of rail infrastructure, especially for corridors with significant potential for passenger rail.

Bold and deliberate policy changes were part of a clear 'pivot'

The successful Swiss practices and governance structures were the result of deliberate policy shifts in the 1980s, as a response to a series of failures at the ballot box and a period of low confidence in the future of public transit. This is an important lesson for the Bay Area, especially as public polling indicates that public transit may not be as highly prioritized as it once was in the region. The Swiss experience indicates that developing bold policy ideas based on a popular vision can galvanize public support, and executing those policy changes over a defined time period can lead to lasting results.

Even prior to asking voters for more funding, the federal government and SBB rolled out clock face scheduling across the regional rail network in 1982. The immediate popularity of the change boosted support from the public, laying the groundwork for the successful 1987 ballot measure to invest further in that coordinated system. For the Zurich region, packaging an integrated regional rail 'S-Bahn' system with clock-face coordinated schedules, and the promise of 'One Journey, One Ticket' proved to be a winning combination that won the confidence of voters in 1981. This directly led to the establishment of ZVV as the region's network manager and the introduction of the S-Bahn Network and the common regional fare structure simultaneously, to great public fanfare, in 1990.

While the Swiss have continued to build off of this success since 1990, the deliberate policy shift toward a networked approach from approximately 1980-1990 was a critical 'pivot' for the country - the Bay Area may wish to consider a similar strategy for time bound multi-year 'pivot'.

A virtuous cycle of increasing investment and ridership is achievable

While Swiss success can be attributed to a distinct 'pivot' toward a networked system in the 1980s, this had led to a virtuous cycle of ongoing improvement, greater integration, and increased public investment and support.

No single ballot measure was a panacea for all of Switzerland's long term transit needs - since the 1980s, many successive ballot measures have gone to voters to approve further implementation of the region's long-term transit service vision. Swiss officials note that practically all ballot measures are successful now because the public trust in the system is so high, and they see the benefits that past ballot measures have brought them.

As the Bay Area advances a regional ballot measure, it may not address all of the region's long term funding needs - successive local and regional measures may be needed. Therefore it's important to consider what are the tangible successful projects that can be realized within a few years from a regional measure, that can help build public trust that new regional funding will lead to transformation; so that future ballot measures can run off of the success of benefits delivered from past ballot measures.





Chapter 7

Next Steps

Chapter 7: Next Steps

Consider Lessons Learned in Existing and Future Initiatives

Bay Area transit operators and MTC have made significant progress toward improving the regional coordination of public transit. This includes establishing a new governance structure and initiatives focused on achieving positive outcomes for the region's transit network.

In 2021, MTC, in partnership with the region's transit operators, developed and adopted the Transit Transformation Action Plan, which focuses on five areas of the region's transit network:

- **Fares and payment:** Simpler, consistent, and equitable fare and payment options.
- **Customer information:** Make transit easier to navigate and more convenient.
- **Transit network:** Transit services managed as a unified, efficient, and reliable network.
- **Accessibility:** Transit services for older adults, people with disabilities, and those with lower incomes are coordinated efficiently.
- **Funding:** Use existing resources more efficiently and secure new, dedicated revenue to meet funding needs.

As part of the action plan, in 2022, MTC and the operators approved the creation of a new Regional Network Management (RNM) governance structure to oversee implementation of the action plan and other initiatives to improve Bay Area public transit, including funding strategies and policy changes.

Some of the actions underway from the Transformation Action Plan include:

- Connected Network Plan/Transit 2050+
- Fare Coordination and Integration Study pilot recommendations
- Mapping and Wayfinding plans and pilots
- Regional Transit Priority Program
- Accessibility and Paratransit coordination
- Regional Revenue Measure planning

If successfully implemented, these actions will move the region toward a more seamless transit network. Many transit professionals that are planning and implementing these actions were also part of the delegation on the study tour to Switzerland. If feasible, the best practices from Switzerland outlined in this report can be incorporated as the actions above are implemented. The region is certainly moving forward with increased fare integration, a top-down approach to regional planning, coordinated efforts to increase revenue, numerous regional pilots and a regional network management governance structure. These are the building blocks that will create opportunities for more coordination and integration such as regional fare products; uniform mapping, wayfinding and real-time information; consistent funding streams; and integrated transit schedules.

Pursue Ongoing Relationships & Learning Opportunities

The momentum and inspiration from this study tour should continue beyond the findings of this report. Ideas for maintaining relationships and creating new learning opportunities include:

- Presentation of this report to key Bay Area public transit stakeholders and political leaders
- Continued meetings and discussions among the delegation about the findings of the study tour and ways to make them actionable
- Regular communication with the transit professionals in Switzerland to learn more details about the concepts introduced in this report and other best practices
- A limited-term employee exchange program between Bay Area and Swiss transit professionals to help advance regional coordination efforts and learn more about how planning and implementation of public transport in Switzerland has maximized the success of transit systems there
- Additional joint conferences with Swiss transit professionals to learn more about their public transport system and details that were not covered on the study tour or the 2022 SwissCal Conference
- Study tours and professional relationship building with other cities and countries in the world where public transit is well-used and well-coordinated at multiple levels

Further Research Needed

The delegation's visit to Switzerland revealed some best practices for operating a world class transit system that is productive, efficient and fully focused on the customer. As detailed in this report, the delegation learned about public transit governance and funding, the integrated timetable, planning and delivery of infrastructure projects and fare integration. This report summarizes what we learned through our numerous meetings and interactions with Swiss transit professionals, as well as our first-hand experience traveling around the country and its cities solely on public transit.

The delegation acknowledges that more in-depth research into each of the report topics is required in order to consider how they could be applied in the San Francisco Bay Area. In addition, the topics selected in this report do not cover the many other aspects of Switzerland's public transit system that make it one of the most successful in the world. As an example, the delegation observed clear and consistent mapping, wayfinding and real-time information across multiple public transit systems throughout the country. Further research into this aspect of the country's system would be beneficial as another best practice for the Bay Area to learn from.

Research and learning opportunities should not end with this report. Rather, we hope our experience in Switzerland is the start of further examination of successful public transit in the country and throughout the world with the goal of creating a world-class transit system in the San Francisco Bay Area.



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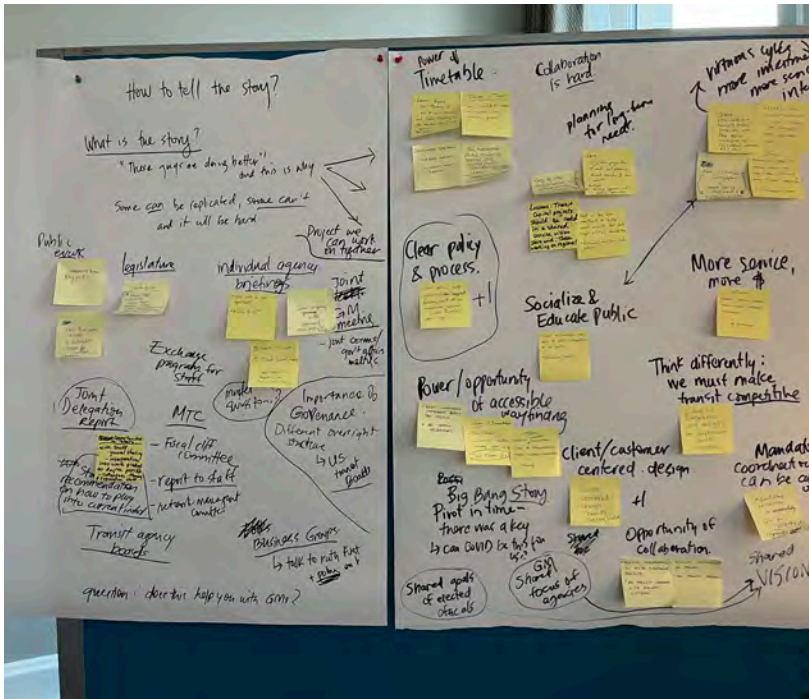
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**2023 Study Delegation of San Francisco Bay Area
Transit Professionals to Switzerland**

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