

Railway systems and their transition
Lecture 6

Customers Passenger Traffic

Peter Kummer
EPFL, Autumn Semester 2025
October 28, 2025



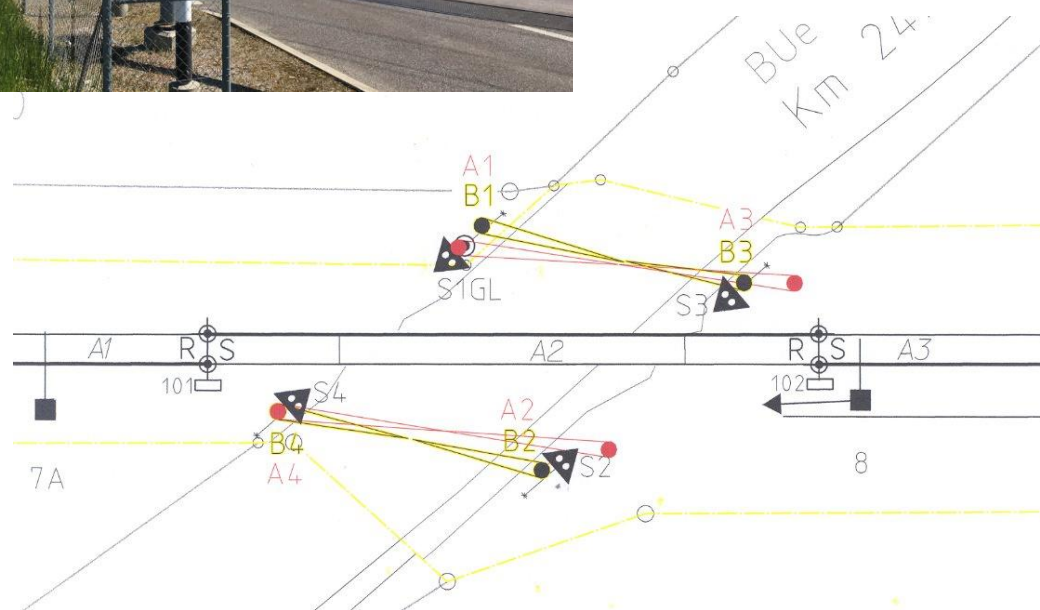
Agenda.

1. Intro
2. Pitch «Case Study» from last time
3. Customers Passenger Traffic
4. Case Study «Customer interaction»

Case Study Traffic Management Systems.

Student pitch.

Level crossing case investigation.



Description

- 1 train every 15 minutes
- Track
- Main road (including pedestrian)

Questions

- What hazards exist and how might they arise?
- How many accidents occur?
 - Are accidents caused by technical failures or human error?
 - What is the probability of a technical failure versus human error?
- What are the implications for this level crossing system?
- What does this imply for approximately 4,000 level crossings in Switzerland?
- What are the impacts on rail transport?
- What design principles should be applied to level crossings to reduce technical failures (SIL)?

Railway systems and their transition
Lecture 7

Customers Passenger Transport

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Customers Passenger Transport.

1. Key Concepts and Products
2. Customer Needs, Products and Demand incl. Excursus Customer connectivity
3. European price-performance comparison
4. Sales channels
5. Customer support.
6. Integration of first and last mile
7. **Development to ensure future viability.**
8. Conclusion



1. Key concepts and products.



What customers want: safe, punctual
and clean travel from A to B.





But: travelling from A to B does not just mean going from station to station.

By Video/Motion/Car/Van/Bus



The recipe for success of Swiss public transport is: «one journey, one ticket.»

St. Gallen–Rapperswil

Train

Rapperswil–Zürich

Ship

Zürich–Visp

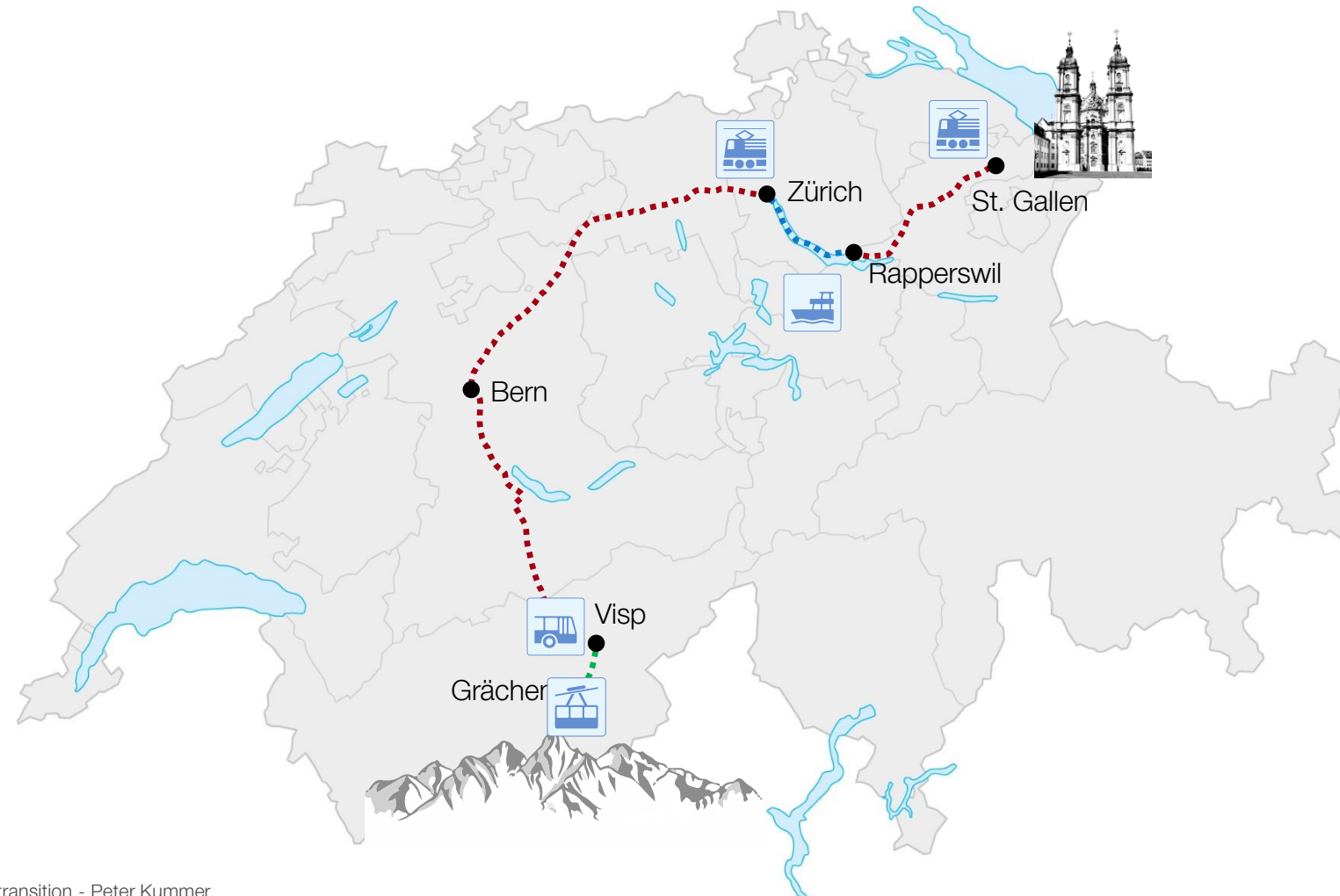
Train

Visp–Grächen

Bus

Grächen–Hannigalp

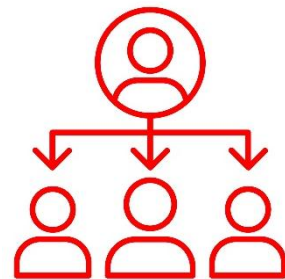
Mountain railway



What does it take for "one journey, one ticket"?



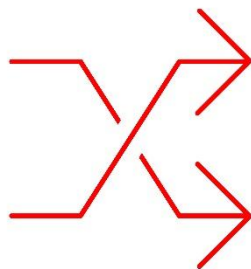
A tariff and product structure that enables customers to travel from A to B



Joint organization and decision-making competence



Common systems and provisions



Harmonised timetable



Innovation and competition of ideas

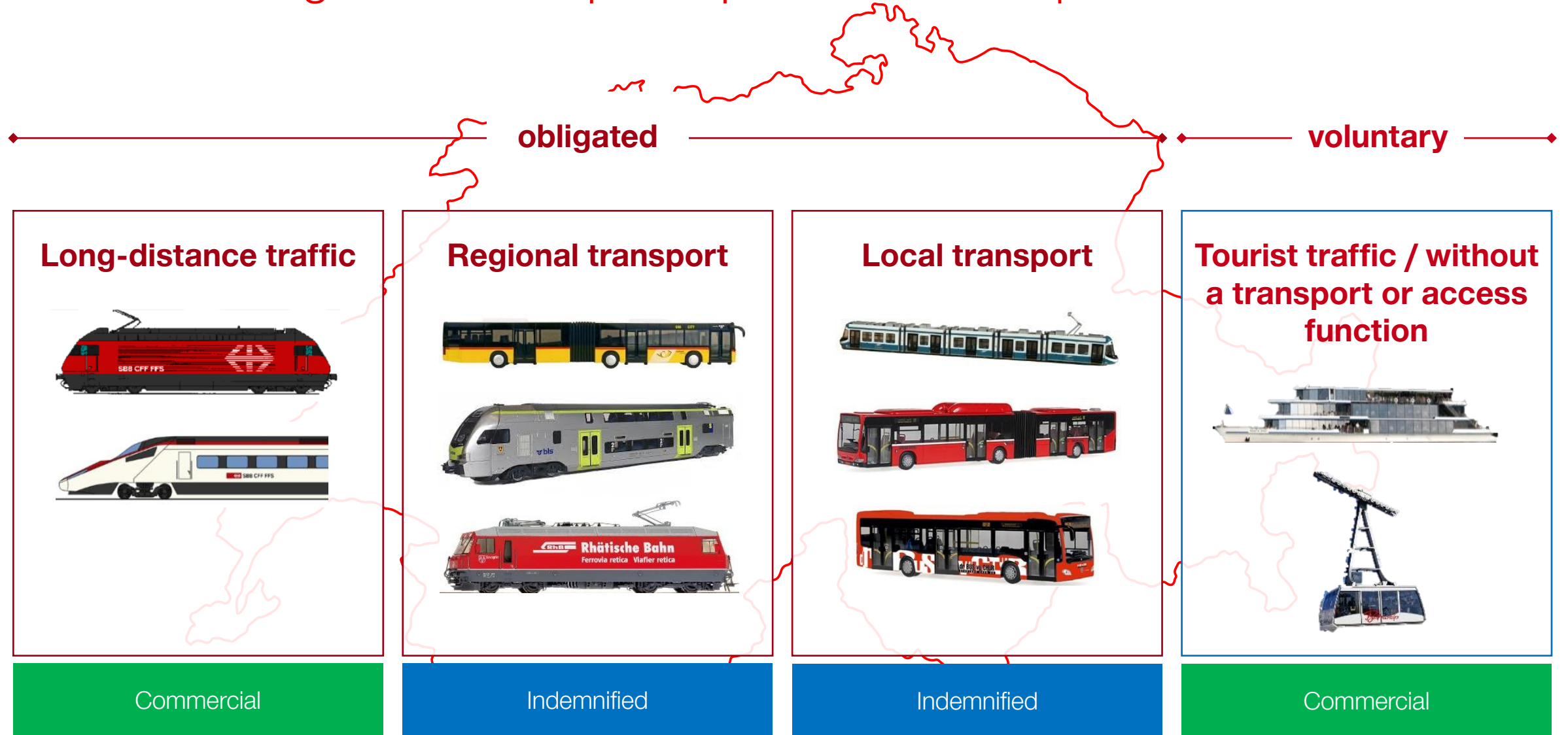


Switzerland's response to that: a unified fare system and a shared organisation to manage it.



- Use the train, bus, tram, boat and cable car with one ticket.
- The "Alliance SwissPass" has decision-making authority and disposal rights over the transport operators.

The law obliges the transport operators to cooperate.





The Alliance SwissPass consists of over 250 transport operators and 20 regional fare networks.





For "One journey, one ticket" to work, fare structure and governance are necessary — but not sufficient; more is needed...



Common systems and standards ensure interoperability.



Central customer database

(Name, address, city, date of birth. Depending on the use case, verified customer data)



Centralised fare calculation

(The service costs the same across all channels; quotas for saver fares/seat reservations)



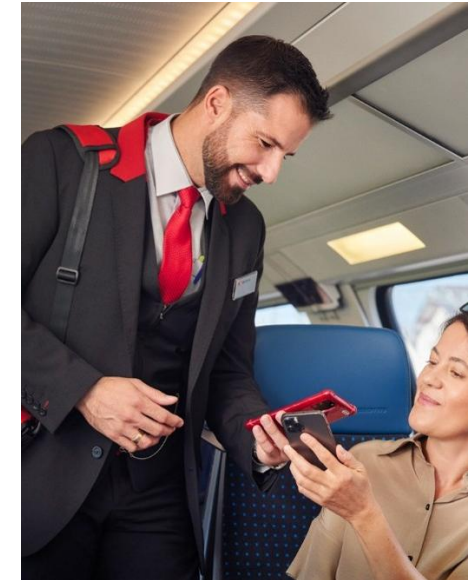
Central service database

(Account based ticketing, i.e. subscriptions and tickets of the individual customer)



Standardized ticket media

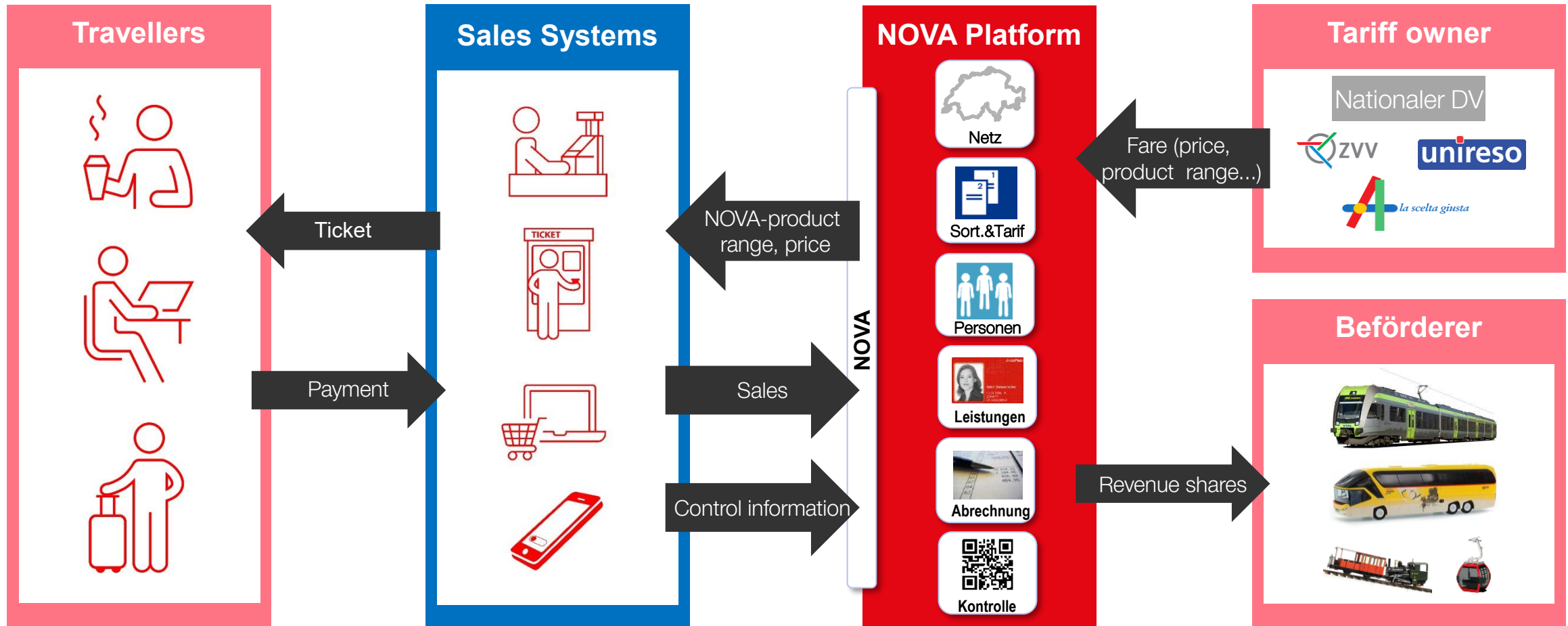
(SwissPass card, SwissPass mobile, e-ticket barcode, Paper ticket, etc.)



Central control database

(Control service checks whether a ticket, for example, exists in the service database or has already been refunded.)

Standardise and centralise only as much as necessary.
Competition of ideas plays a role at the customer interface.



Conclusion.

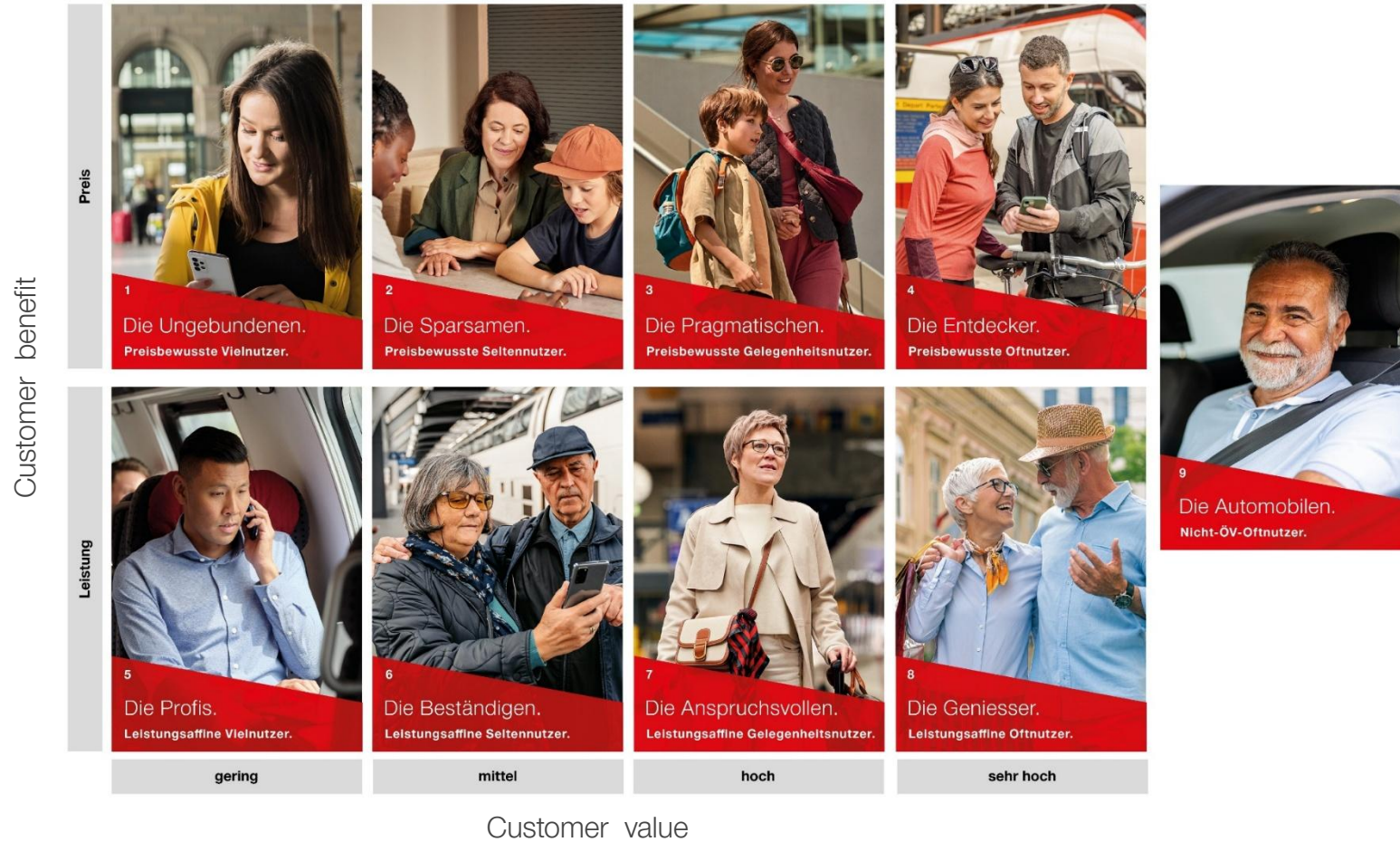
A **unified fare structure** (one journey, one ticket) and **interoperability** between transport operators are hallmarks of public transport in Switzerland. This does not come for free: the **coordination effort is substantial** and the **response times to market changes are extended**.

The subsidised public transport system is funded roughly half by public authorities and half by passengers. This dual funding model and the division of responsibilities between the cantons and the federal government make the system complex.

2. Customer Needs, Products and Demand.





Customers' needs vary widely.

Two segmentation criteria, one goal - more customer focus.

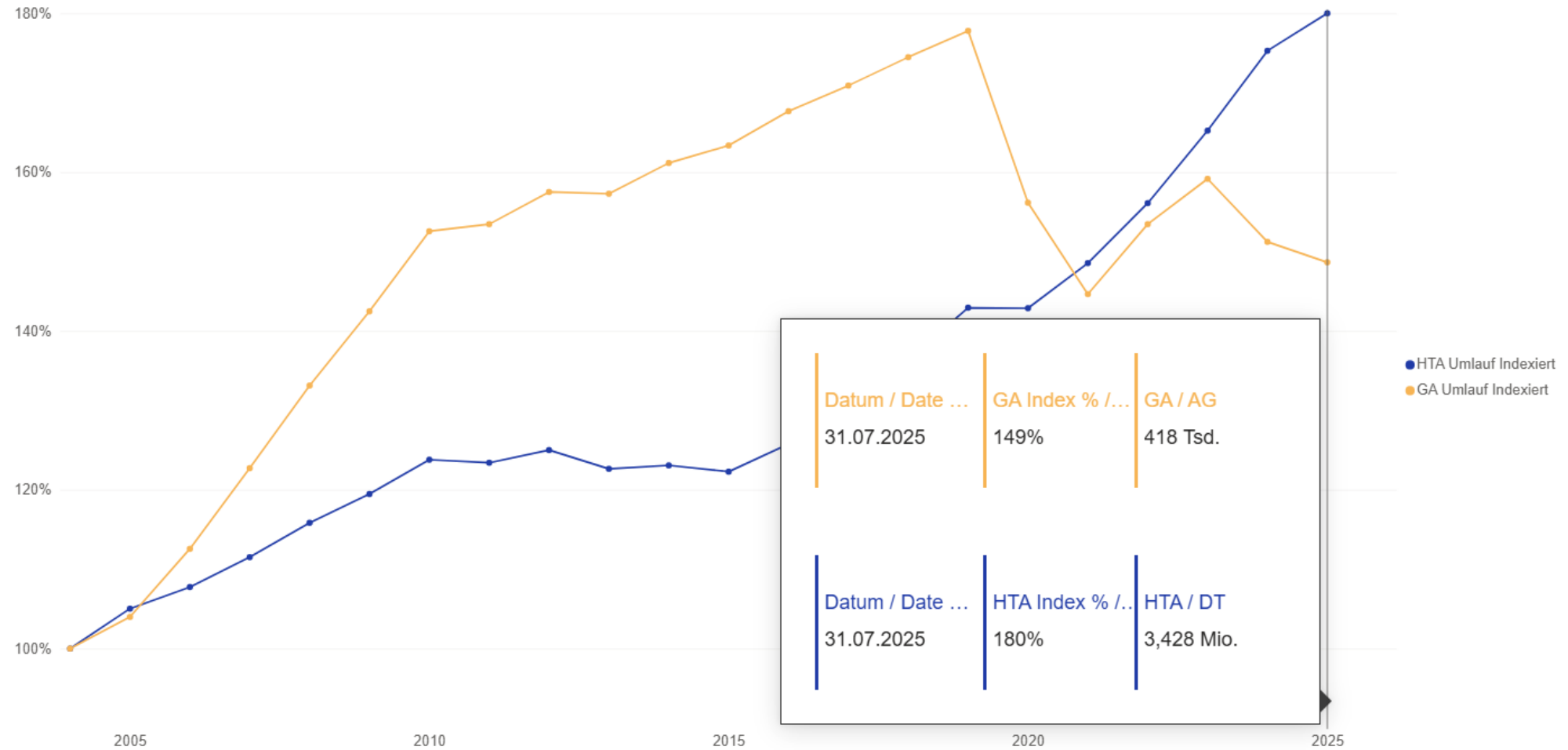




This is reflected in a complex product range and many different fare types.

	 6–15.99 Years	 16–24.99 Years	 25–65 Years	 65+
Tickets (National/Verbund)	– Single and point-to-point ticket – Group ticket – Class upgrade – Cityticket– Supersaver ticket – Route change – Saver class change – Multi-journey ticket			
Day tickets (National/Verbund)	– Children's day ticket	– Day ticket (with/without Half-Fare travelcard) – Dog day ticket – Tandem day ticket – Saver day ticket – Saver day ticket for the municipality – Bicycle day ticket – Friends day ticket		
Flat-rate tickets	– Schultageskarte für 6–24.99 Jahre		– GA Adults	– GA Senior
	– GA Child – GA Child Family	– GA Youth – GA Youth Family	– GA Partner Family – GA Duo Partner – GA People with disabilities – GA monthly pass	
	– GA travelcard for 25-year-olds			
	– Junior-Card – Children's Co-Travelcard			
	– GA Night – Streckenabo Junior	– Modulabo Junior – Verbundabo Junior	– Streckenabo Erwachsene – Modulabo Erwachsene – Verbundabo Erwachsene	
	– Velo-Pass – Hunde-Pass			
Half fare	Fahrt zum reduzierten Preis	– Half fare youth	– Half fare	
Half fare PLUS		– Half fare PLUS youth (Balance amount CHF 1000/2000/3000)	– Half fare PLUS (Balance amount CHF 1000, 2000 und 3000)	
Tourist Offerings	Free with the Swiss Family Card	– Swiss Travel Pass Youth – Swiss Travel Pass Flex Youth	– Swiss Travel Pass – Swiss Travel Pass Flex	
		– Swiss Half Fare Card	– Interrail/Eurail	
Additional offers	– RailAway	– Baggage transport	– companion day ticket	– Seat reservations

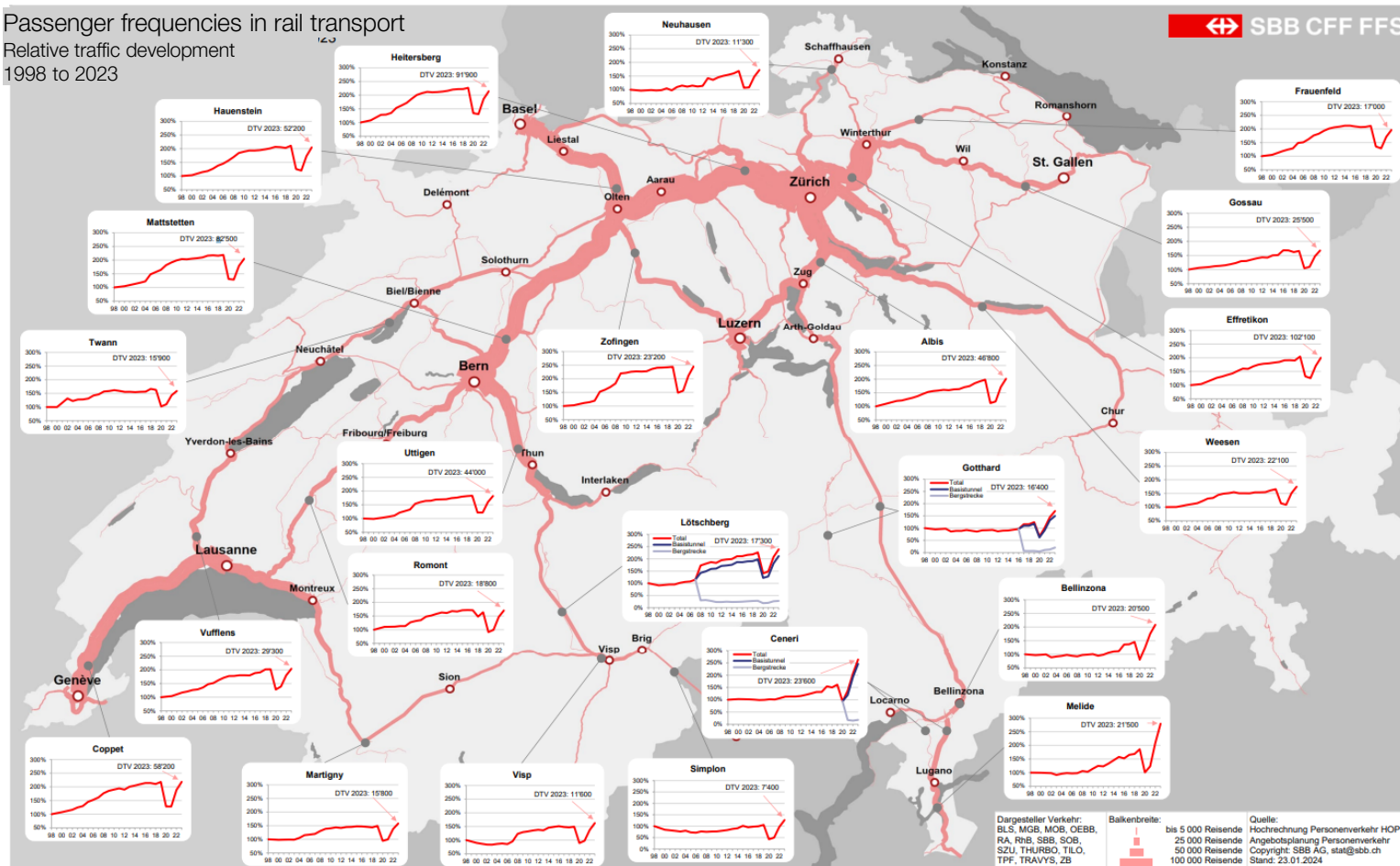
Half-fare cards and GA travelcards.



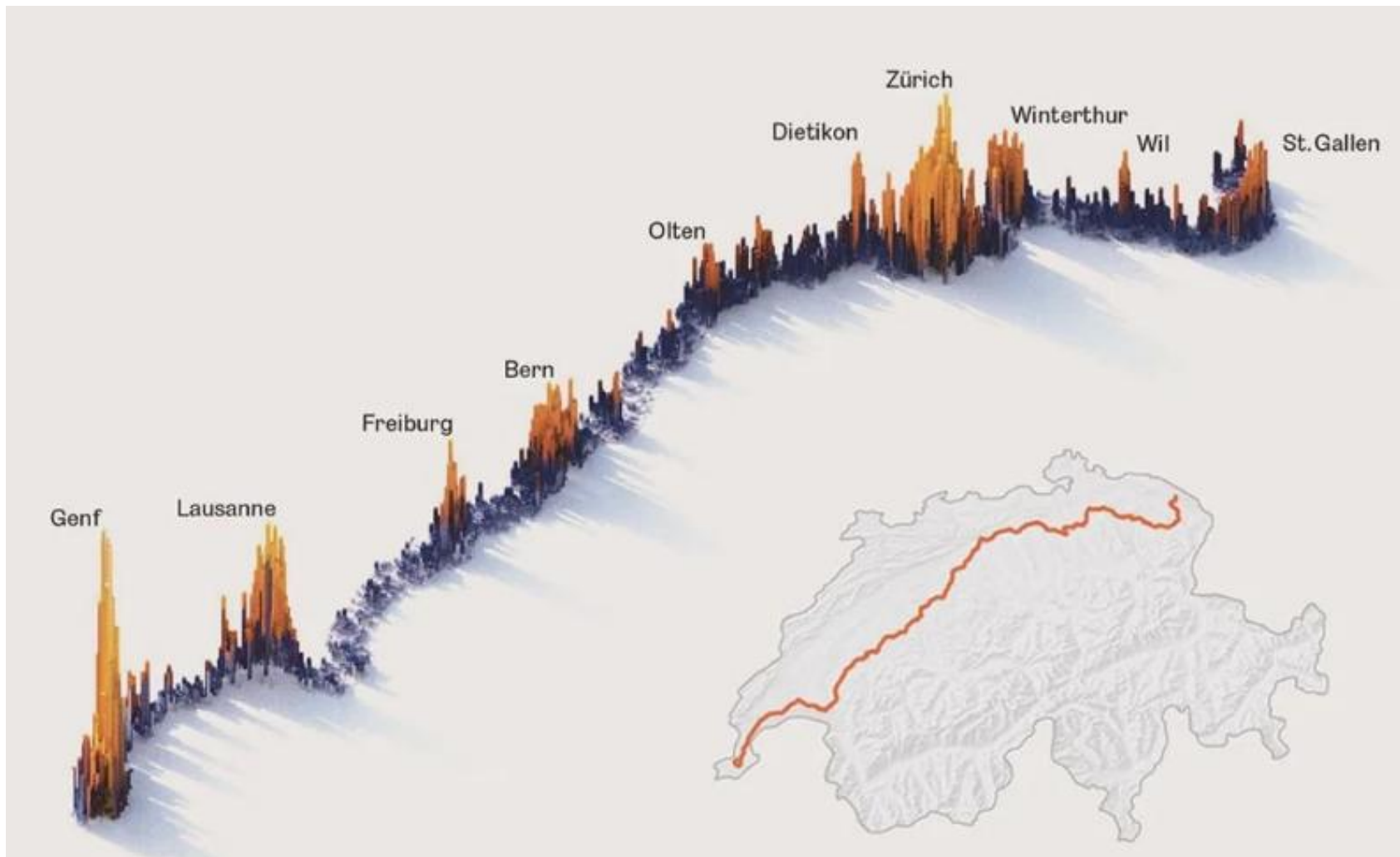
Source: Alliance Swiss Pass

Customers mainly travel on the Bern – Basel/Zurich and Lausanne – Geneva routes.

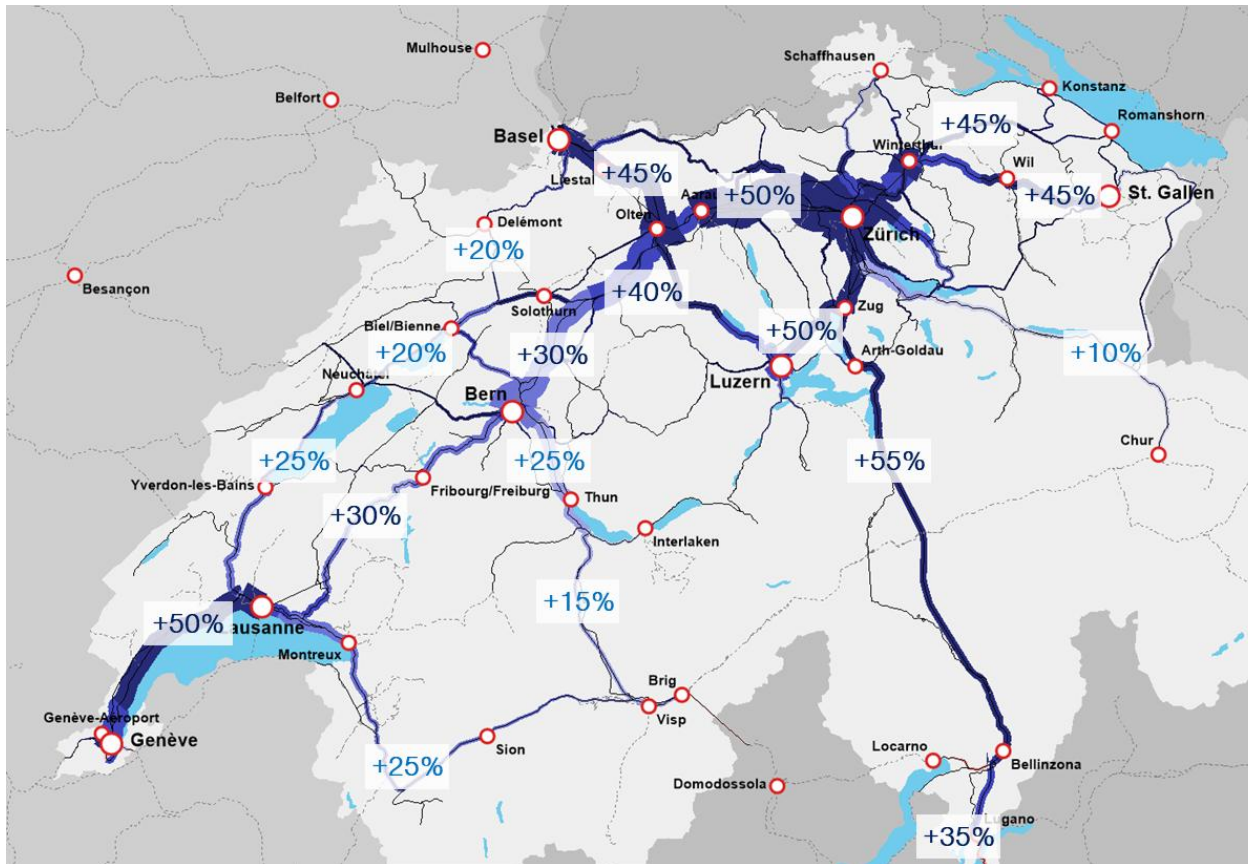
Passenger frequencies in rail transport
Relative traffic development
1998 to 2023



One third of Switzerland lives along this railway line.



Strong growth until 2050: the same hotspots will remain.



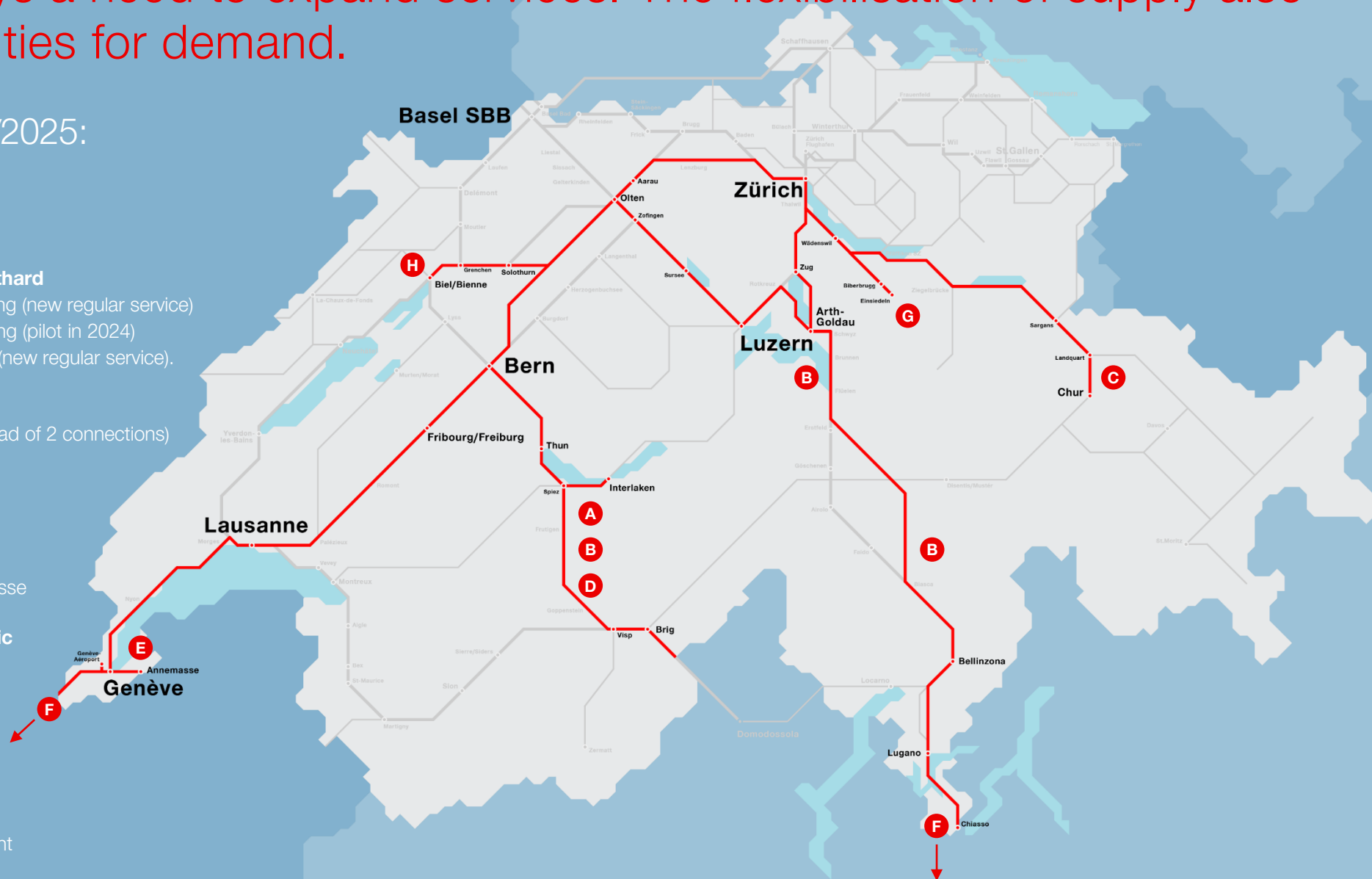
- Growth 2023–2050 of +34% (passenger-kilometres).
- Stored in Rail Development: Federal demand forecast.
- Includes demand increase consolidated from the AK35 service expansion.

Source: SBB, Simba
Verkehrsperspektiven 2050 ARE

There is not always a need to expand services. The flexibilisation of supply also creates opportunities for demand.

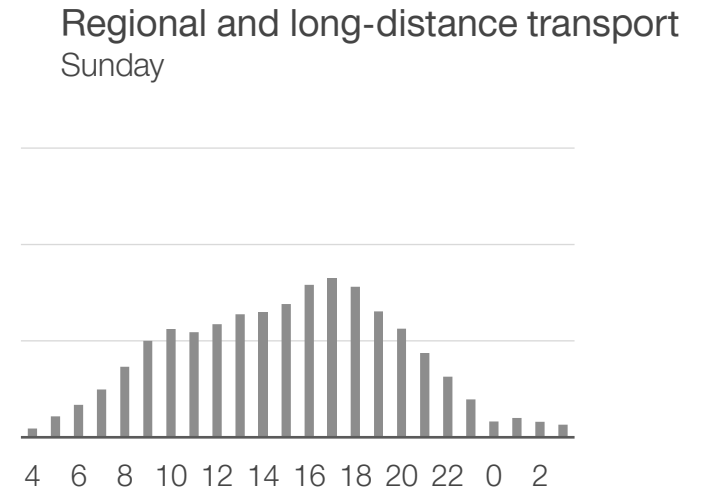
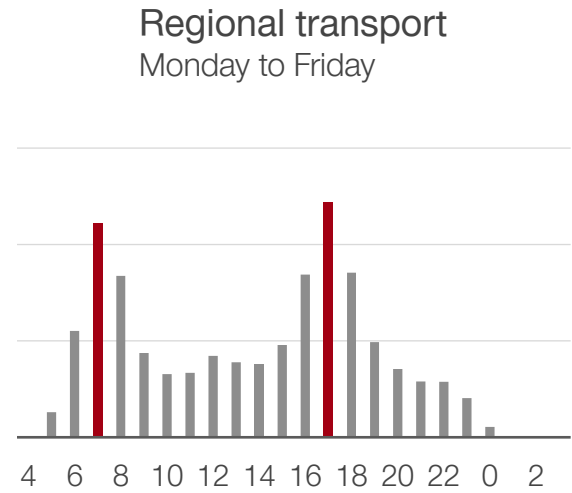
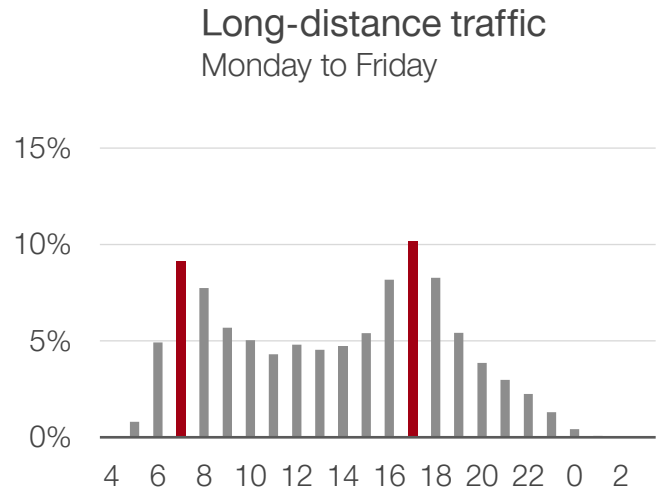
Measures timetable 2024/2025:

- A** **Direct train Zürich – Brig**
Zürich – Brig in 2h via Ostermundigen
- B** **Capacity expansion Lötschberg / Gotthard**
 - Direct train Ticino – Romandie Su morning (new regular service)
 - Non-stop train Luzern – Ticino Sa morning (pilot in 2024)
 - Additional train at short interval for relief (new regular service).
- C** **Expansion of direct connections**
Genève – Bern – Chur Sa/Su (new 4 instead of 2 connections)
- D** **Off-peak train pair**
Bern – Brig instead of Interlaken
- E** **Genève – Annemasse**
Additional stops on RE Genève - Annemasse
- F** **Seasonal offers in int. passenger traffic**
Build on insights from the 2023 pilots
(Sestri Levante, Marseille, 7.ZP München)
- G** **«cross-country skiing Express»**
Zürich – Einsiedeln Sa/Su
- H** **«Pyjama-Express»**
Olten – Solothurn – Biel/Bienne Fr/Sa-Night

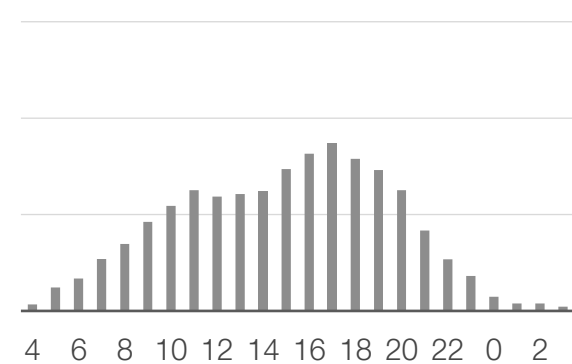
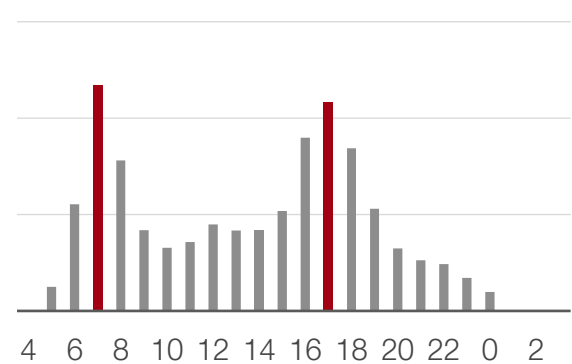
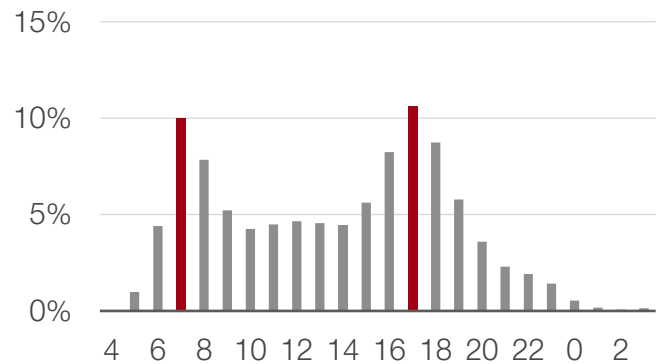


Customers primarily travel in the morning and evening peak hours.

Zürich HB

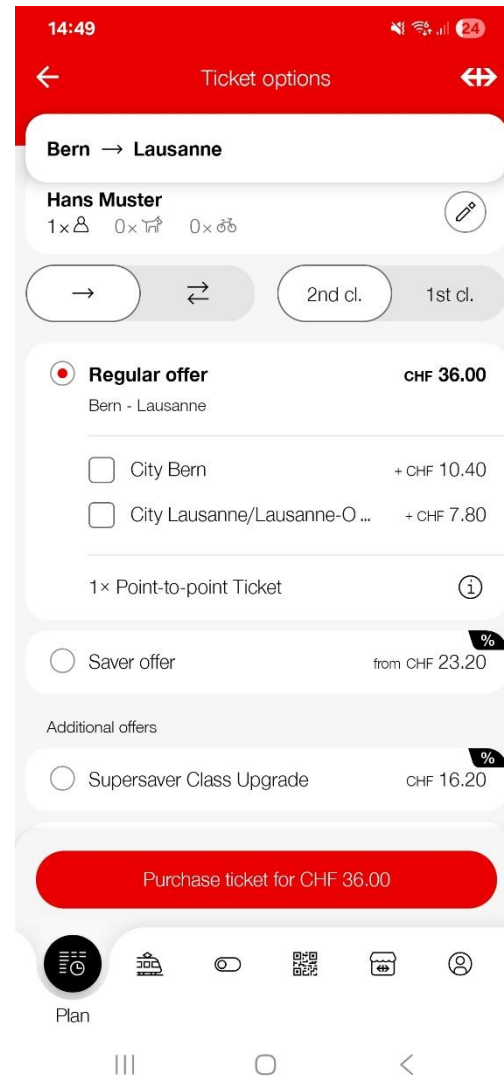


Gare de
Lausanne



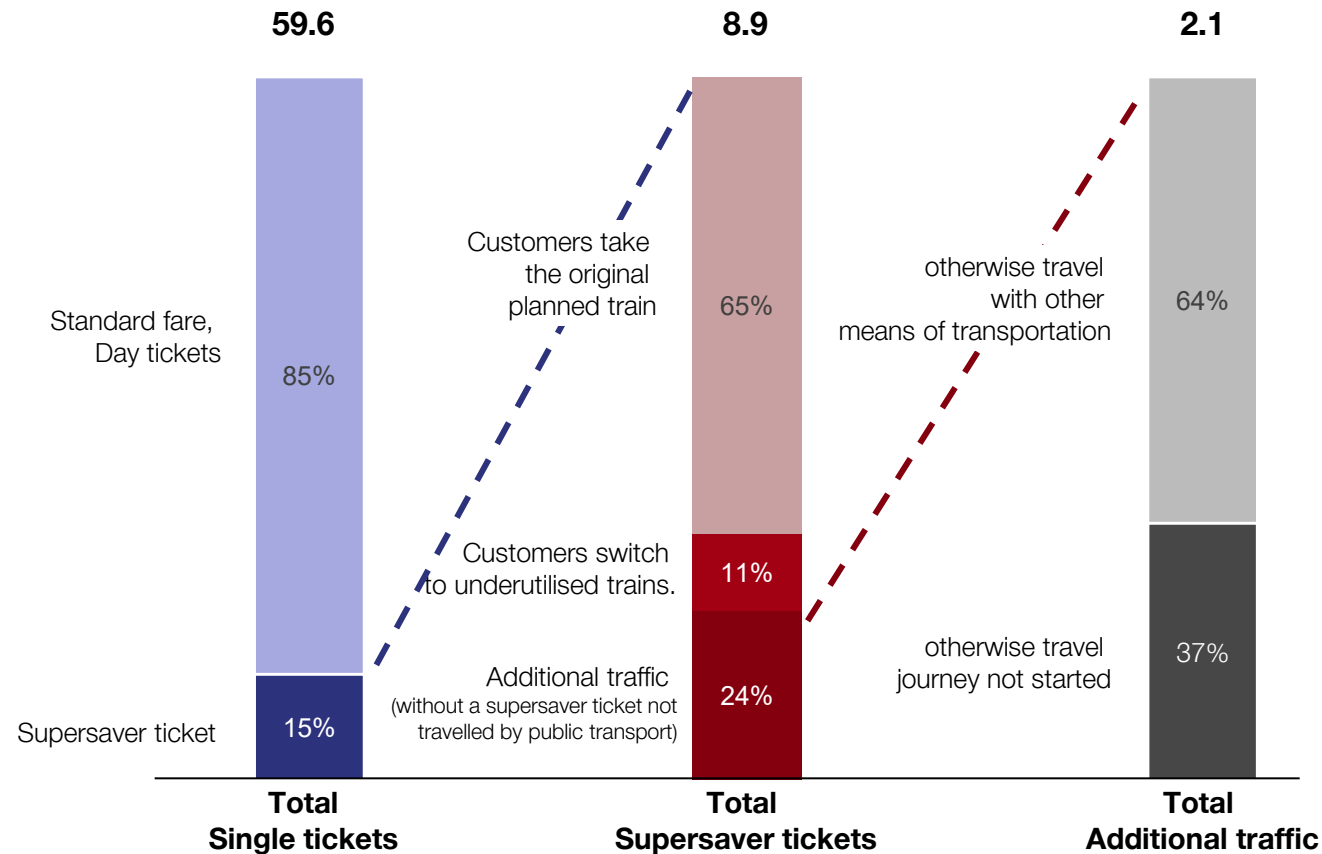
Percentage of passenger traffic per hour in the arriving and departing trains in Zurich HB and Lausanne, respectively.
Peak traffic hours (HVZ) are Monday to Friday from 6:00 a.m. to 8:59 a.m. and from 4:00 p.m. to 6:59 p.m. (Source: reporting.sbb.ch).

Supersaver Ticket.



Customers can be influenced by financial incentives.

Thanks to supersaver tickets, 2.1 million additional journeys were made on public transport in 2024.



Impact: Supersaver tickets are extremely **popular** with customers and...

- **steer customers** to trains that are underutilized: 11% of customers change the originally planned travel time thanks to supersaver tickets.
- **generate additional traffic** (2.1 million additional trips): Approximately 24% of customers only made the trip thanks to the available discount.

Sales in million units by sales date, FY 2024

Note: The split of passenger behaviour with supersaver tickets and additional traffic is based on results from market research, cumulative values for FY 2024.

Steering customer behaviour is limited with flat-rate season tickets.



The Half-Fare travelcard costs CHF 190 per year.

The GA travelcard costs CHF 3,995 per year.

On average, a GA customer pays 15 cents per kilometre driven. Compared to the other subscriptions and single tickets, this is the cheapest price.

Adjusted school hours also help to reduce demand peaks.



Half-fare PLUS as a response to changing customer behaviour.



The public transport industry decided in autumn 2022 to introduce the half-fare PLUS and include it in the standard range.



- MVP launch at the 2023 timetable change
- Product completion 2024–2025
- Further developments 2025–2026



With an industry-wide rollout of the half-fare card PLUS, the public transport sector must evolve into a payment-instrument issuer.



Balance	CHF 1'000	CHF 2'000	CHF 3'000
Adults	CHF 800 (Bonus 20%)	CHF 1'500 (Bonus 25%)	CHF 2'100 (Bonus 30%)
Youth (-25% compared to adults)	CHF 600	CHF 1'125	CHF 1'575



- Zone tickets of the fare networks
- Point-to-point tickets NDV
- Day tickets of the fare networks and NDV
- Saver fares
- Reservations
- Dog and bicycle tickets
- Internal tickets of the automatic ticketing system (post-pricing)

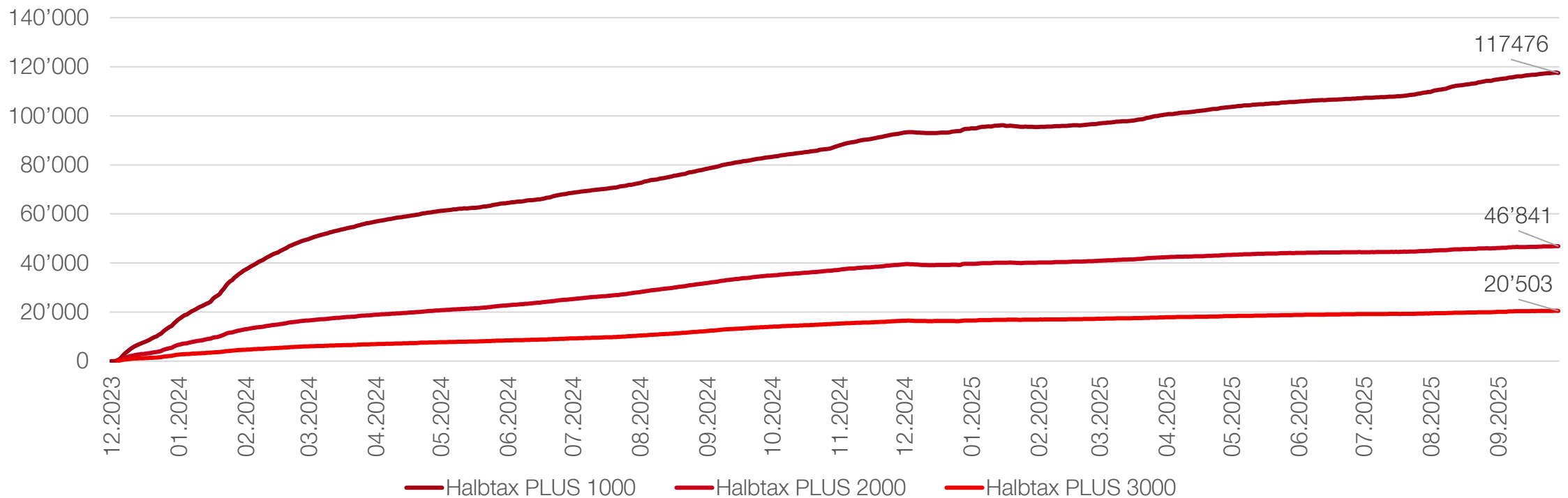


- Personal credit for max. 1 year
- Can only be used via digital channels
- Any remaining customer deposit will be refunded after 1 year
- Bonus expires after 1 year

The half-fare PLUS travelcard is very well received.

- The Half-Fare PLUS circulation has developed well and, like sales, is above original expectations.

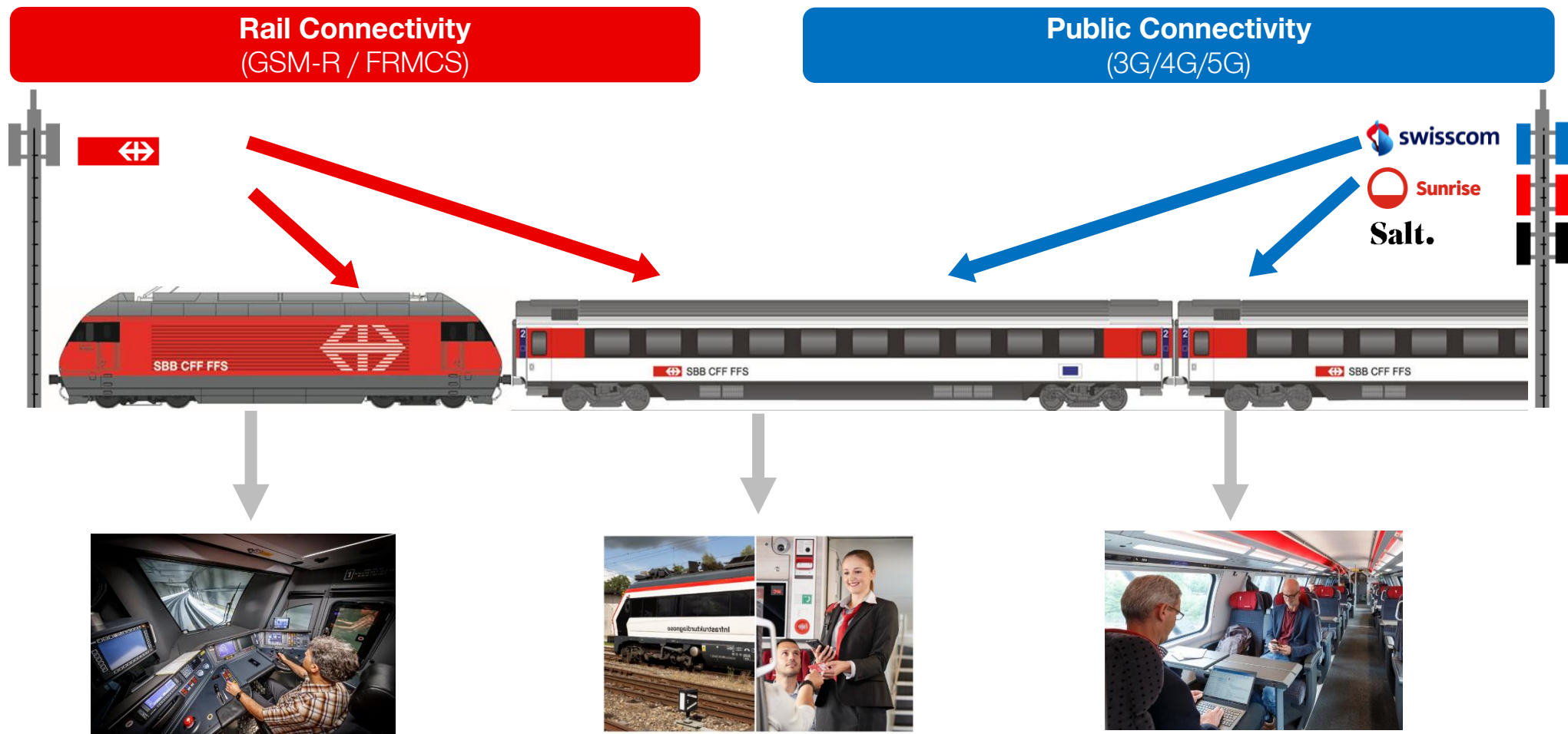
Development of the half-fare travelcard PLUS



Excursus customer connectivity.

Public connectivity and rail connectivity.

Both are important.



Functions critical for railway operations

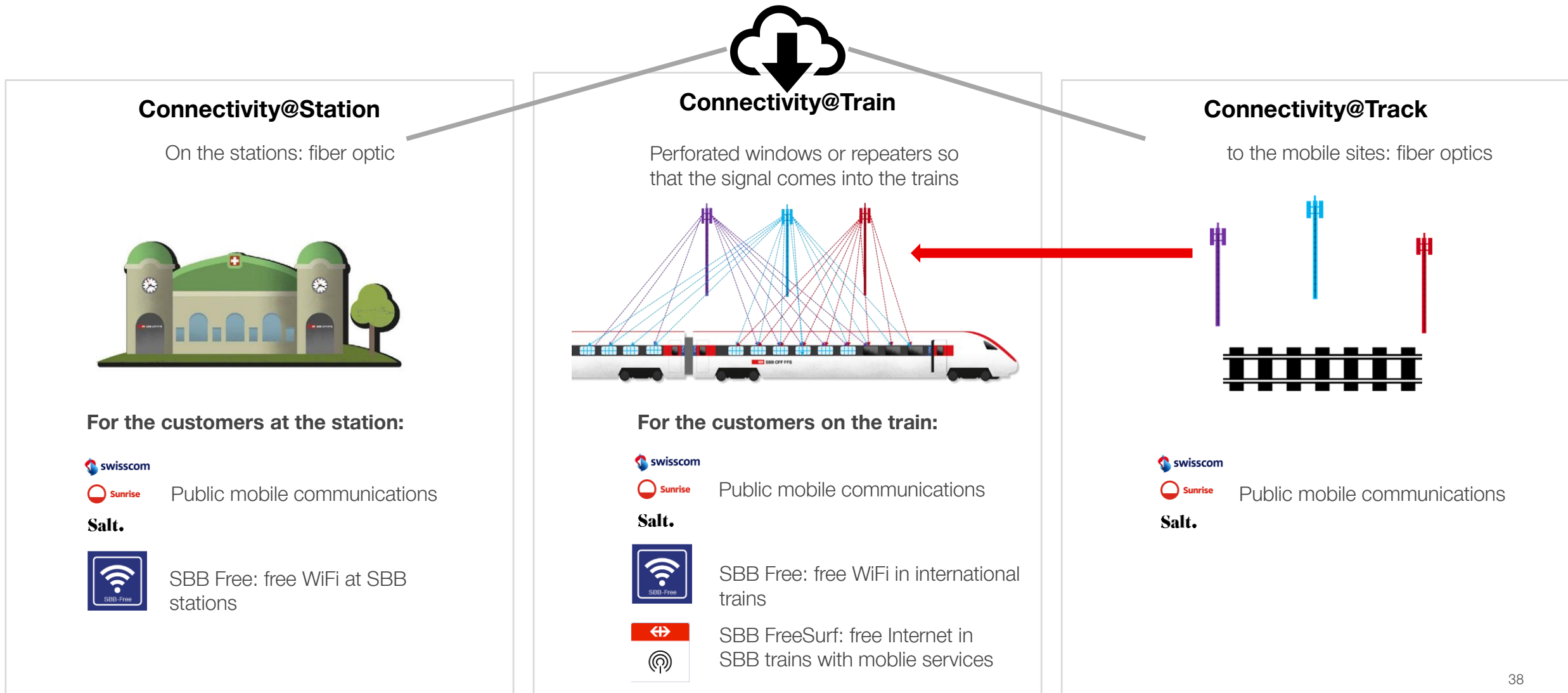
Functions critical for customers

Public connectivity is key for the passenger.



- Connection with social networks.
- **Travel time as working time.**
- News and entertainment on the go.
- Customer Information.

Connectivity Strategy: Technology mix between WiFi and mobile services.



Connectivity@Train.

Overcome the Faraday cage effect.

Repeater



What:

Signal amplifiers (repeaters) bring the mobile signal into the interior of the car.

Since when:

Since 2000 in long-distance and regional transport as a retrofit for modernisation and New procurements until 2018.

Cellular-permeable windows



What:

Cellular-permeable lenses in which a small part of the metal layer is lasered away during production.

Since when:

Since 2018 in long-distance and regional transport for modernizations and new acquisitions.

Windows retrofitted to mobile communications



What:

Existing windows are subsequently lasered when installed and thus permeable to mobile communications.

Since when:

Since 2023 in long-distance and Regional.

WiFi



What:

WiFi-Router

Since when:

Since 2018 in international traffic. Giruno and Astoro fleets (60 trains)

Today, 97% of the SBB fleet is equipped with repeaters or HF windows in the log distance and 83% in the regional traffic.

Of these, approx. 30% of the fleet is equipped with cellular-permeable windows.

Cellular-permeable windows- History.

Mobile phone permeable windows ex works:

- November 2015 **First exchange with EPFL**
- Dezember 2015 SBB-interner Steckbrief «WindowWave»
- Oktober 2016 Erste Messungen im Testbetrieb (IC2000). Nur Unterdeck (Prototyp).
- Juni 2017 Grosser Vergleichstest (Messzug). Vergleich MIMO-Repeater, SISO-Repeater und mobilfunkdurchlässige Scheiben
- Januar 2018 Erste Messung Wagenkasten (Typ Domino).
- Juni 2019 Freigabe für Rollout – Modernisierung IC2000
- Sept. 2019 Freigabe für Rollout – Domino (RV)
- 2019 – 2022 Weitere Fahrzeuge: «Seetaler», EWIV, IC Bt, EC, Flirt Tilo

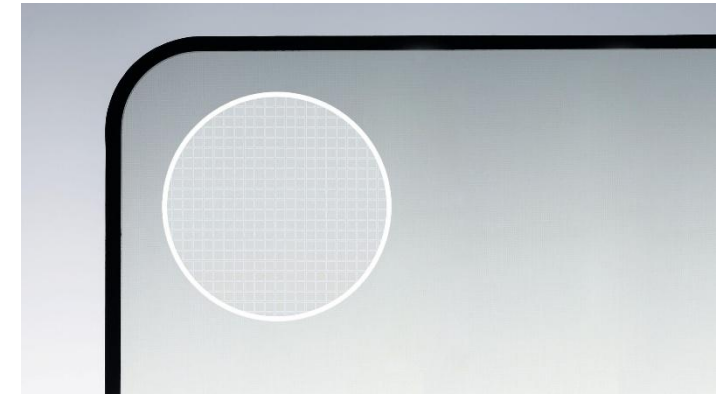
Aktuell: Standard bei Modernisierungen

- 2022 Neubeschaffung «Flirt Evo», KISS RABe 512, Giruno (Optionsbeschaffung)

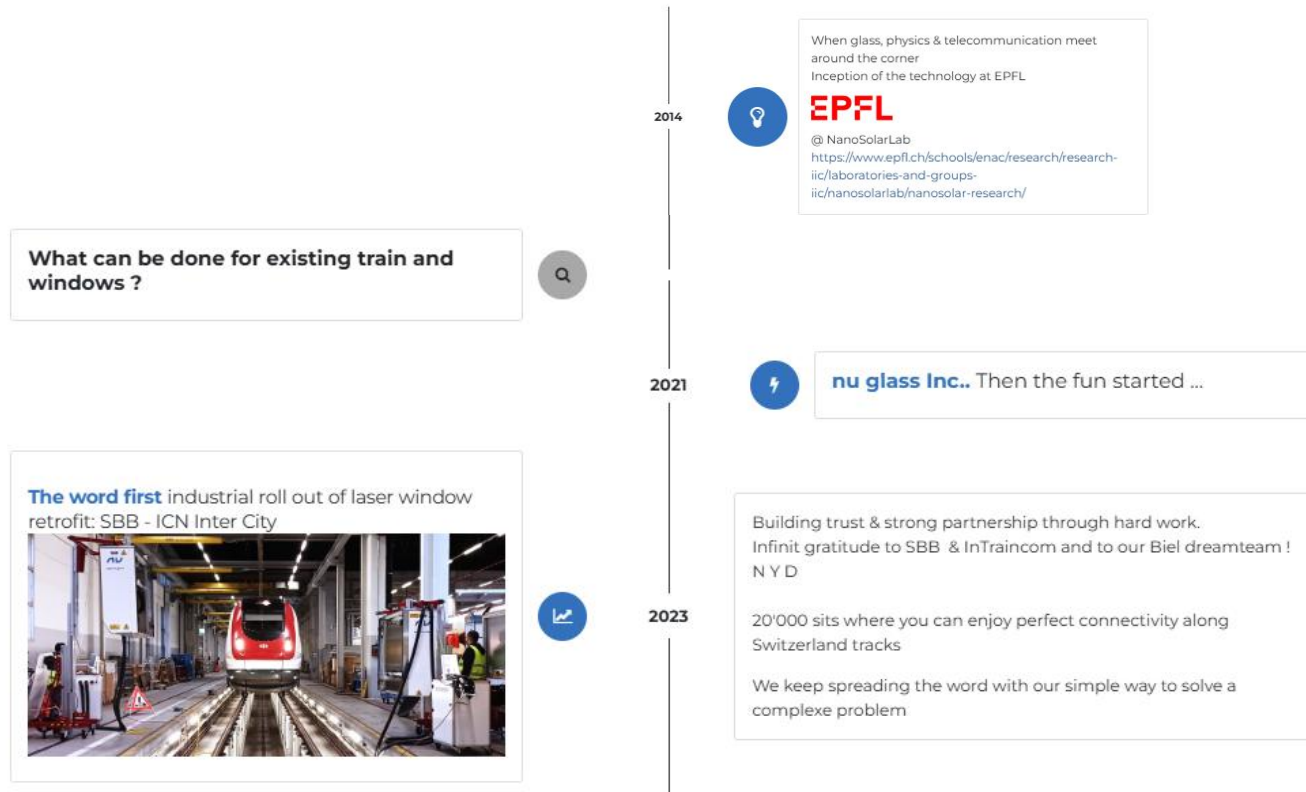
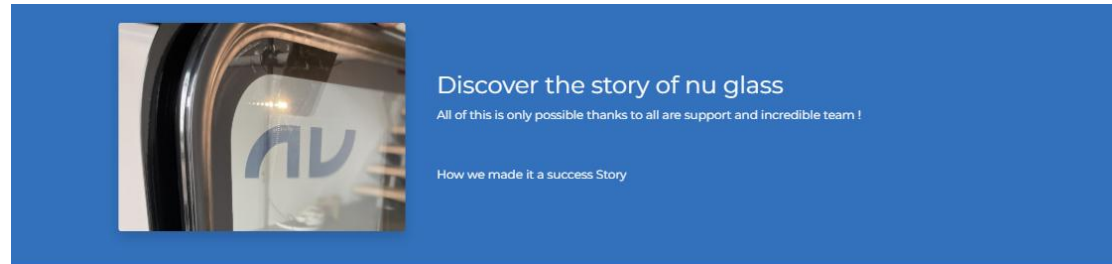
Aktuell: Standard bei Neubeschaffungen

Lasering of existing windows:

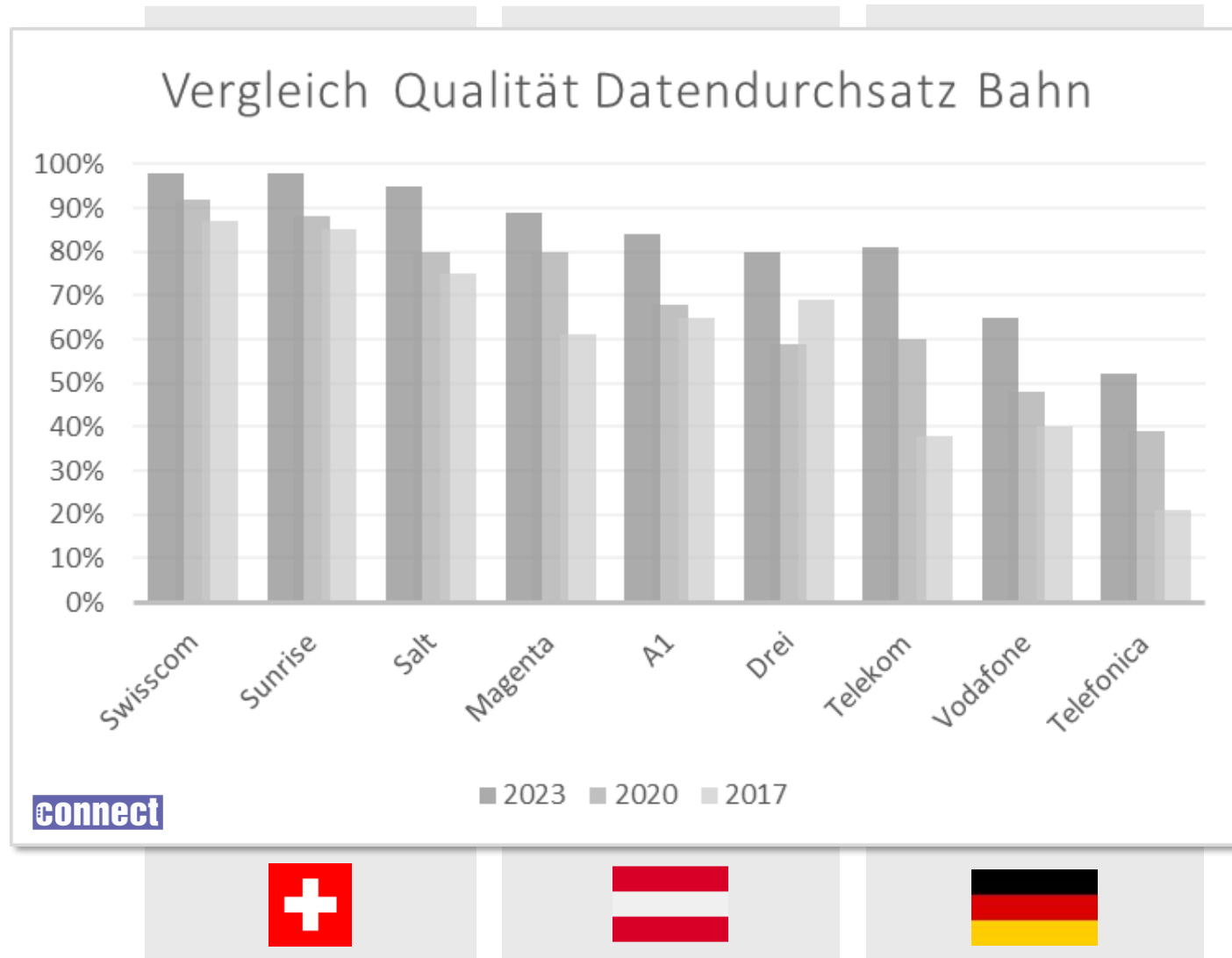
- April 2021 **First exchange with EPFL on the Topic "Posttreatment«**
- November 2021 Erste Tests an einem ausrangierten Fahrzeug (EWIV) in Olten
- September 2022 Pilotfahrzeug (ICN) im kommerziellen Betrieb
- Juli 2023 Rollout ICN-Flotte (280 Wagenkasten) => abgeschlossen
- Nov. 2024 Rollout DTZ-Flotte (196 Wagenkasten/Doppelstock) => in Arbeit
- Nov. 2024 Rollout FV-Dosto-Flotte (460 Wagenkasten/Doppelstock) => in Arbeit



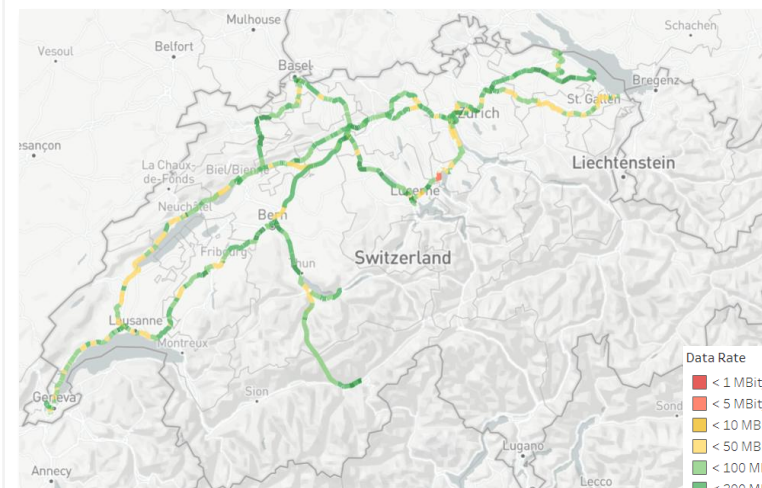
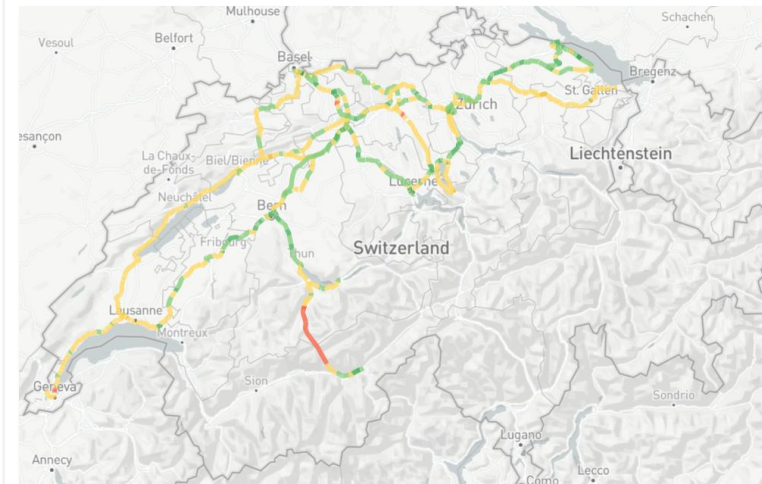
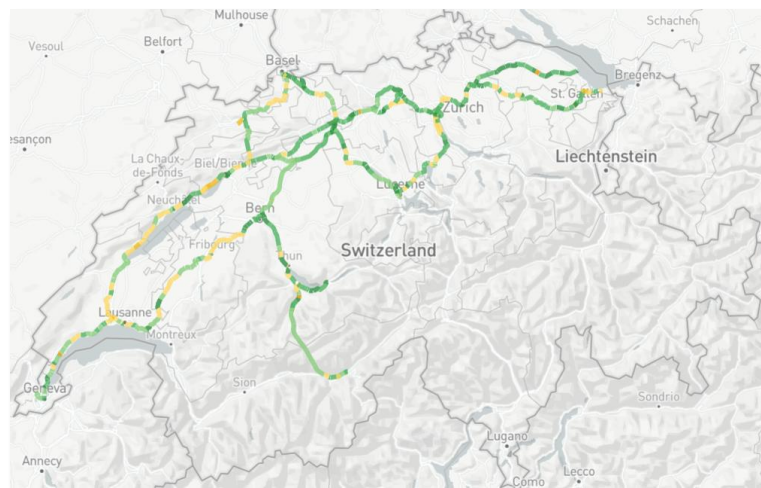
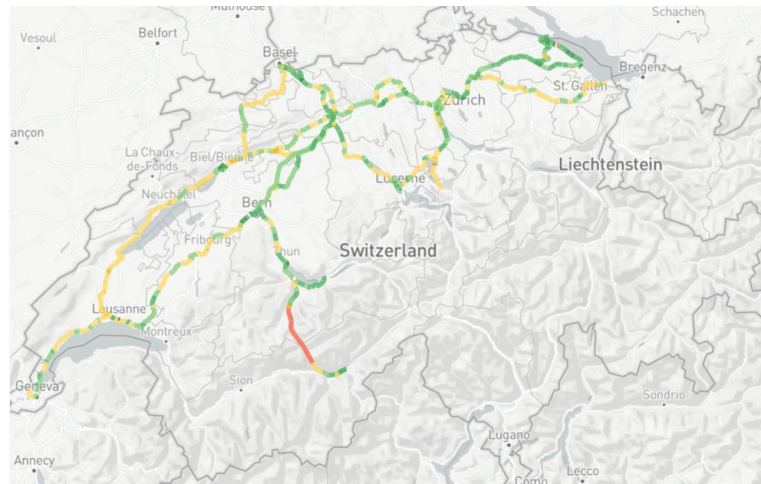
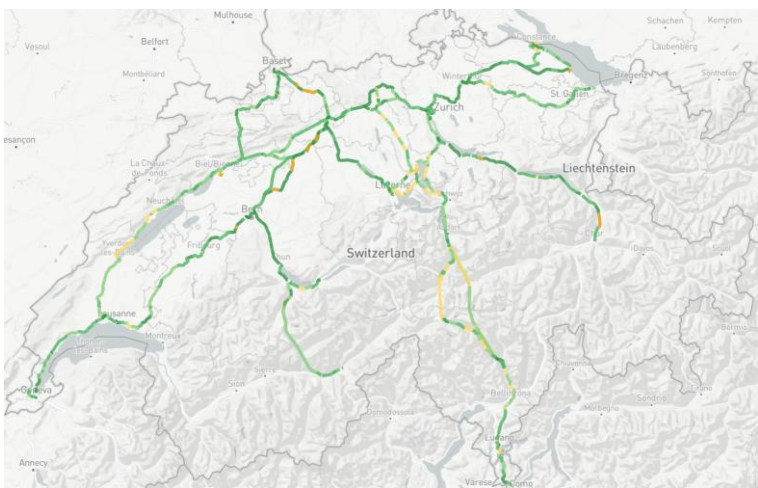
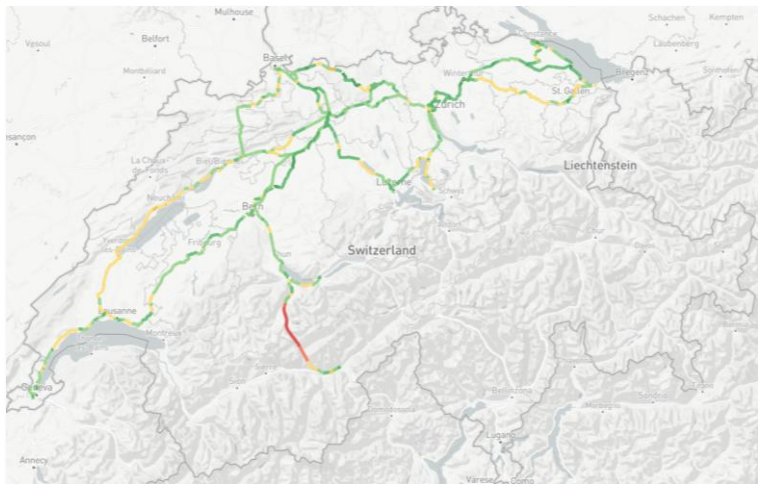
Strong relationship with EPFL.



Comparison of mobile internet quality.



Railway mobile coverage depends on the telecom providers.



- Data Rate
- < 1 MBit/s
 - < 5 MBit/s
 - < 10 MBit/s
 - < 50 MBit/s
 - < 100 MBit/s
 - < 200 MBit/s
 - < 400 MBit/s

Skala
0,5 MBit/s bis 400 MBit/s

Conclusion.

- The main driver for the use of public transport is the offering.
- Well-coordinated timetables, seasonally varying direct connections and short transfer times are key.
- Aligning infrastructure with demand peaks is too expensive.
- Product and pricing measures to smooth demand make sense (e.g. supersaver tickets, Half-Fare travelcard Plus instead of a flat-rate ticket).

3. European price-performance comparison.

4. Sales Channels.



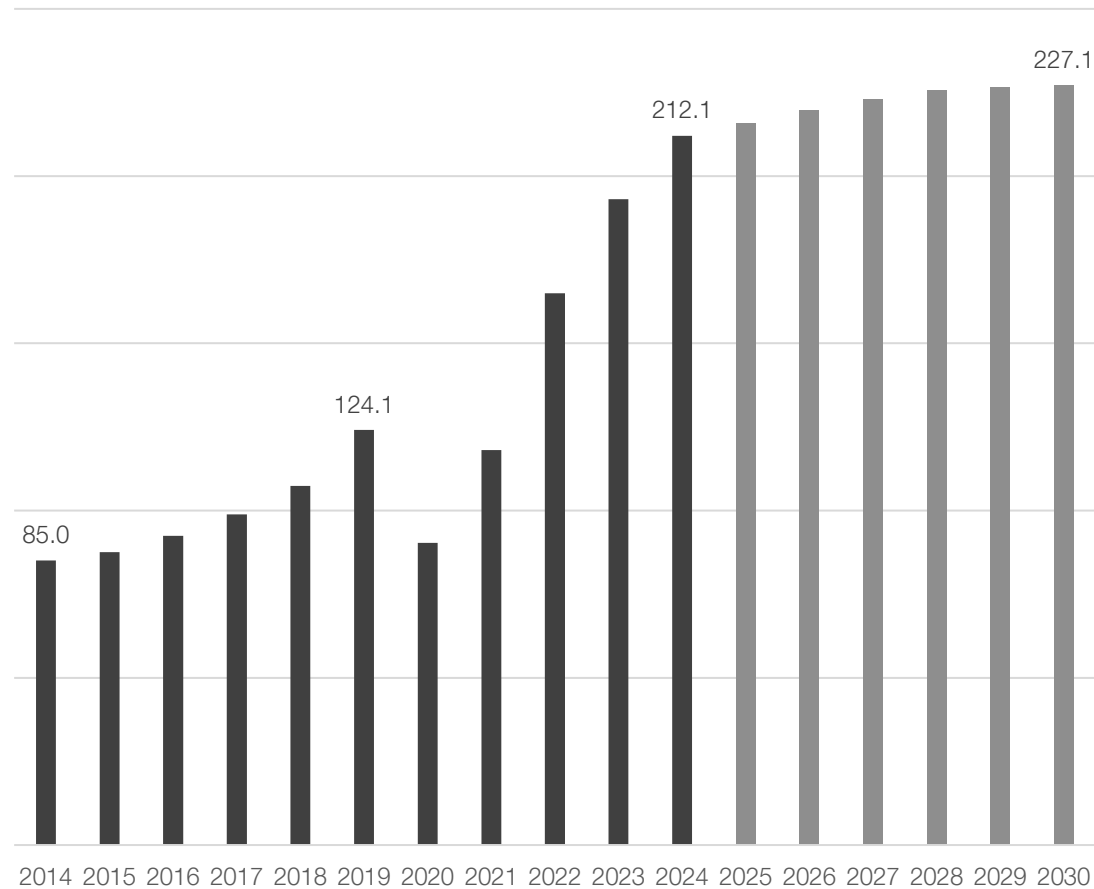
The customer's need is to travel from A to B — not to buy a ticket.



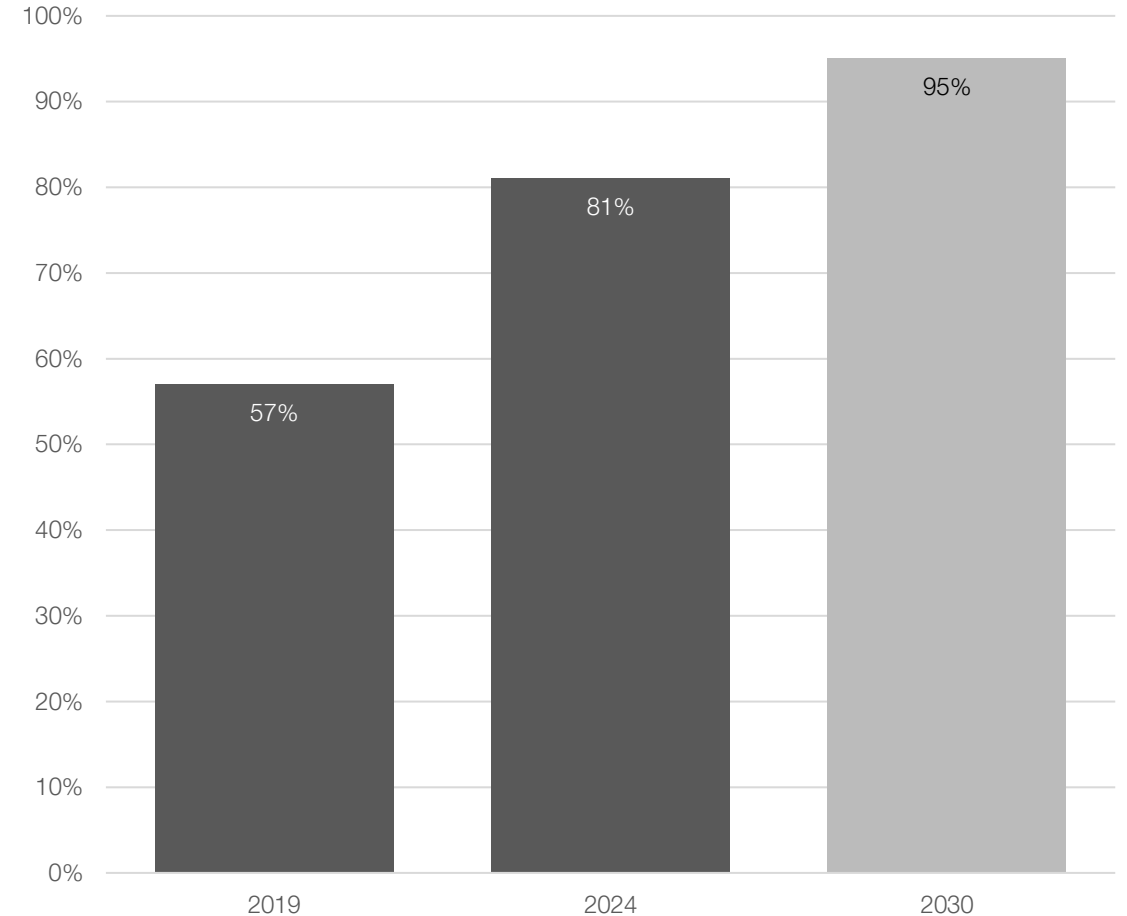


Digitalisation is anchored in the Sales Strategy 2030: increase digital share of sales to 95%.

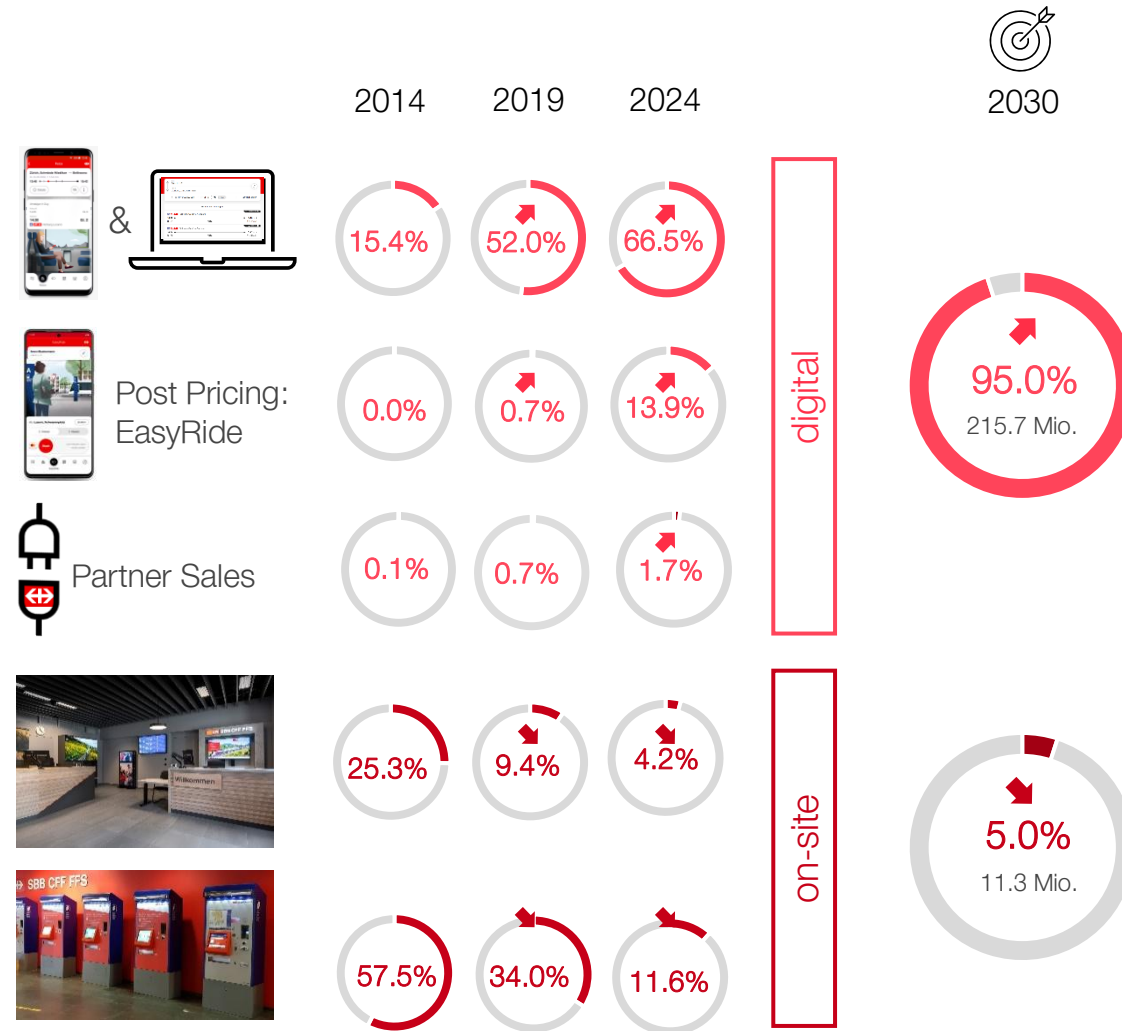
Number of tickets sold & subscriptions in millions



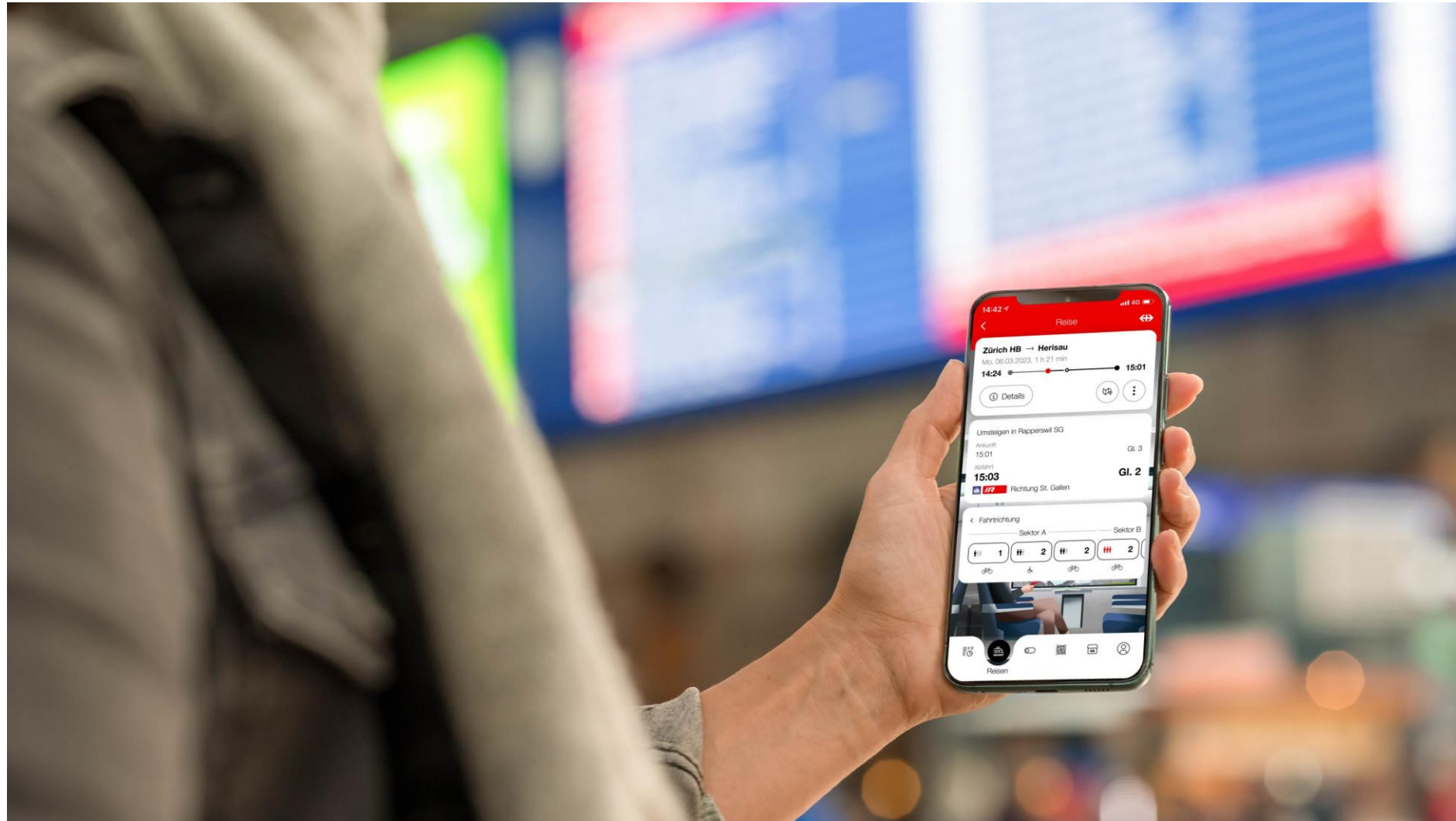
Digital share



Strong growth in digital channels is coming at the expense of ticket office sales and ticket vending machines.



Mobile.



SBB Mobile in terms of numbers.



8 millions
timetable enquiries
per day



4.5 millions
active user
per month



25 – 49 age
is the age of half of the users.



Approx. 79 percent
Share of total sales of SBB
SBB Mobile incl. EasyRide (20%)



75 percent
of users are logged into
the app



CHF 5.2 million
Sales volume per day (SBB
Mobile incl. EasyRide (740K))



490'000 Tickets
tickets sold per day
(SBB Mobile incl. EasyRide (101K))



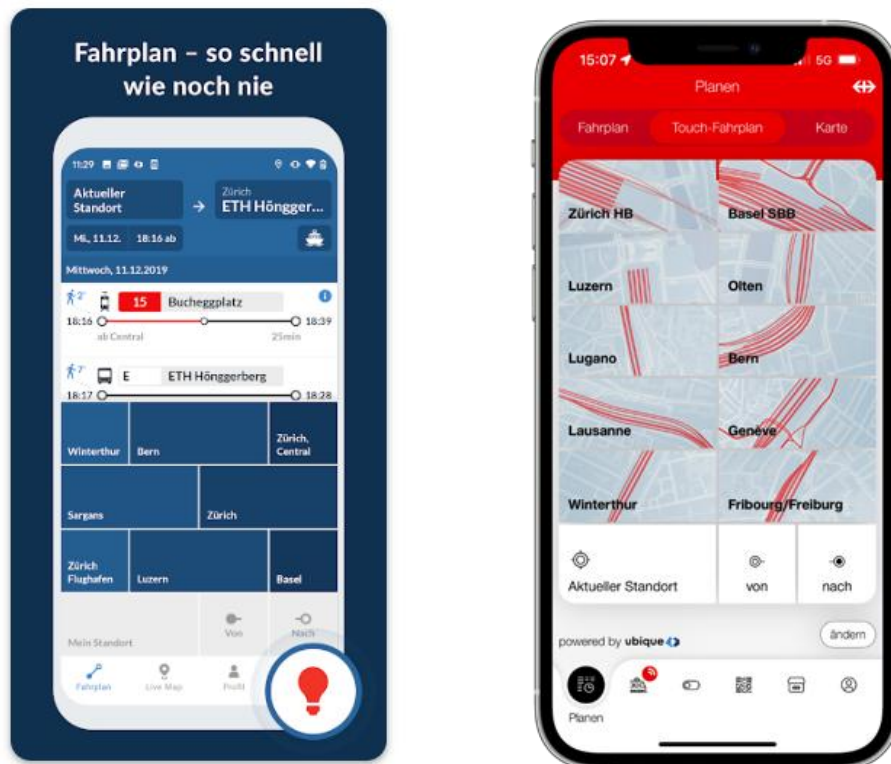
200'000 times
The SwissPass is presented
digitally via the app 200,000
times a day



Approx. 40 percent
Share of SBB's international
sales

Innovation capability and scaling.

Technology partnership using the example of Ubique's touch roadmap.

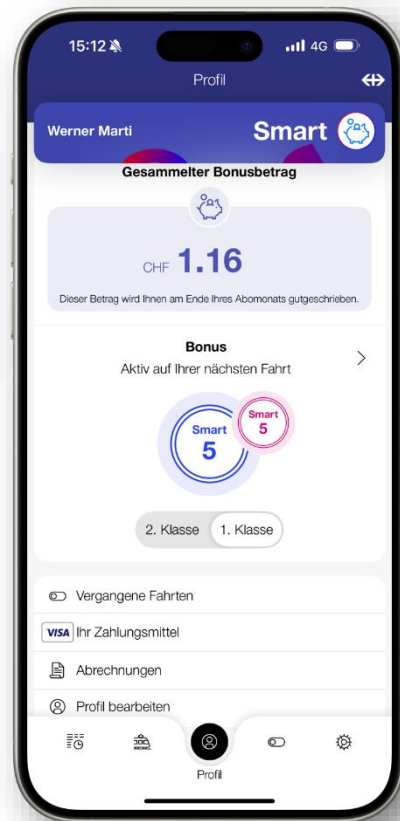
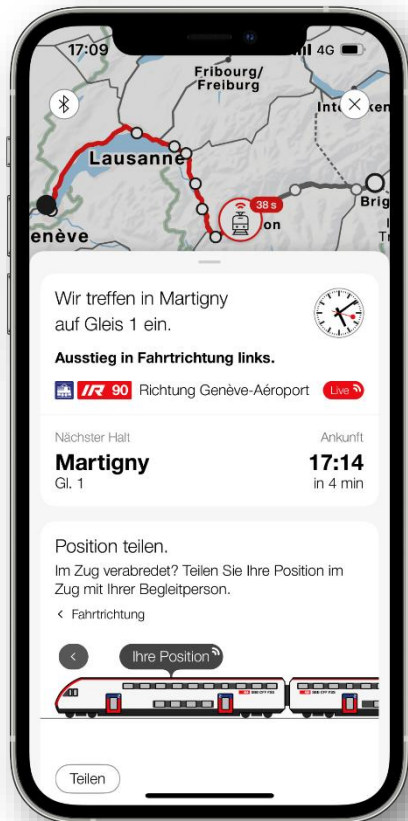


Commercial partnerships using the example of SMAPI and Urban Connect.



Source: Whitepaper [Urban Connect](#)

Mobile app and preview version.

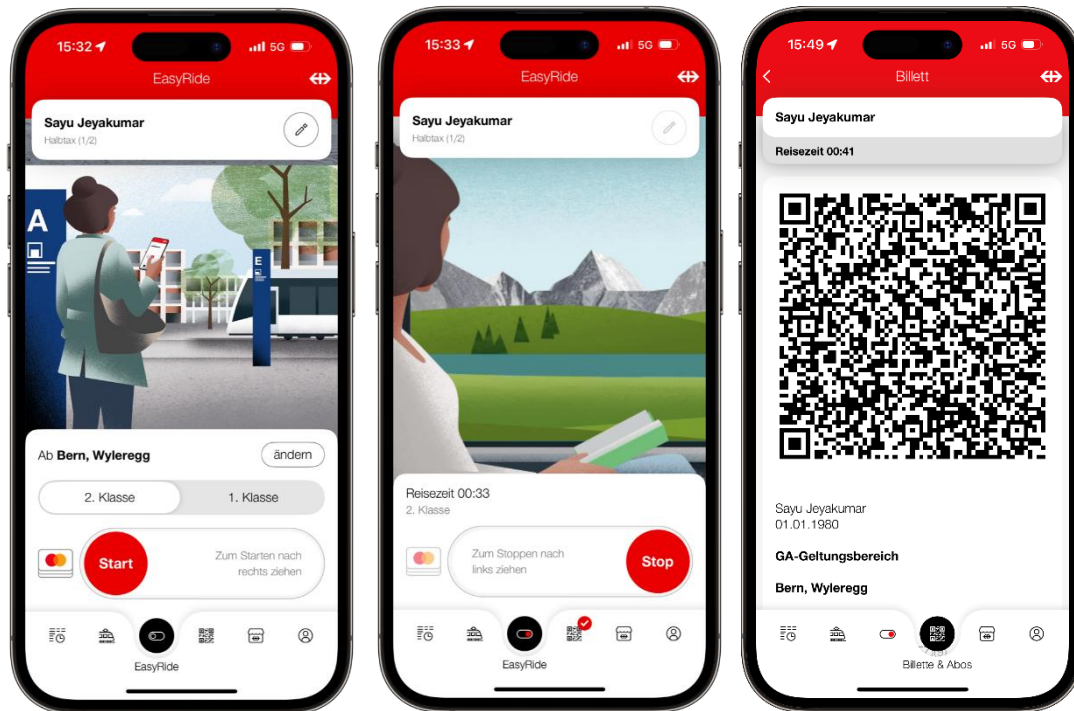


- SBB Preview has **250,000 monthly active users**, 70% of whom use iOS
- SBB Preview is designed **to test new features and optimise** them until they are ready to be rolled out to the masses on SBB Mobile.
- SBB Preview enables **quick feedback** on new features, e.g. through surveys, usability tests, feedback forms, community, in-app, etc.
- Market tests must be possible on SBB Preview and can be conducted in parallel, whereby the UI may also differ.



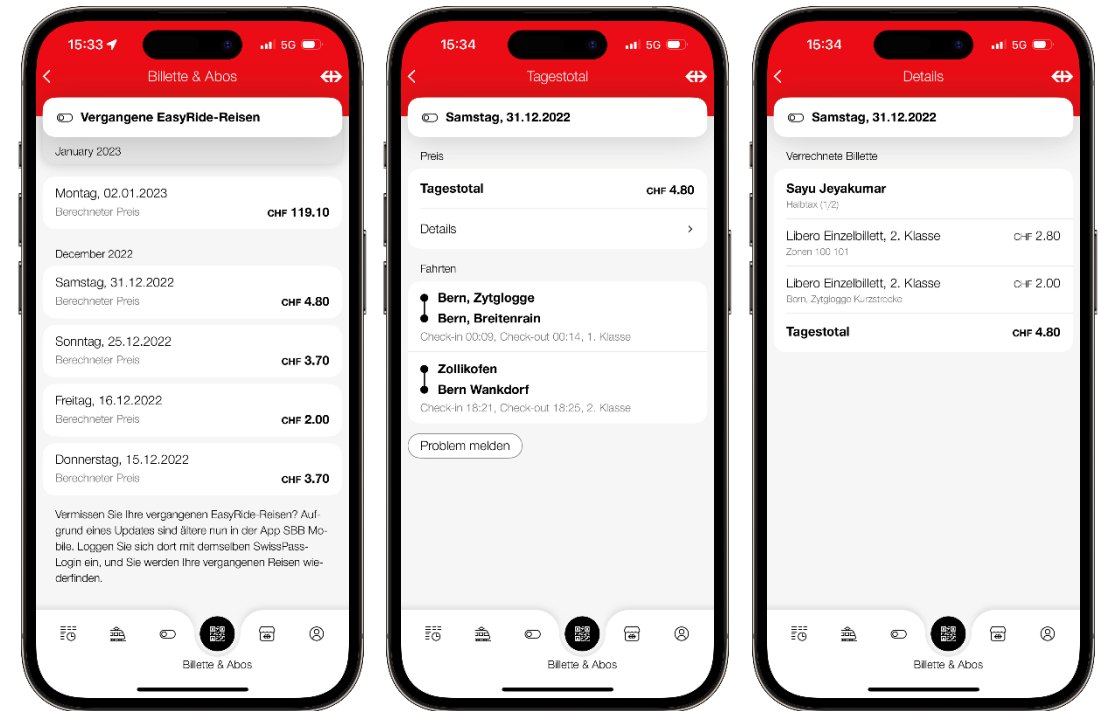
Taking advantage of innovation: Account-based Ticketing - Check-in/Check-out-Systeme

EasyRide Check-In



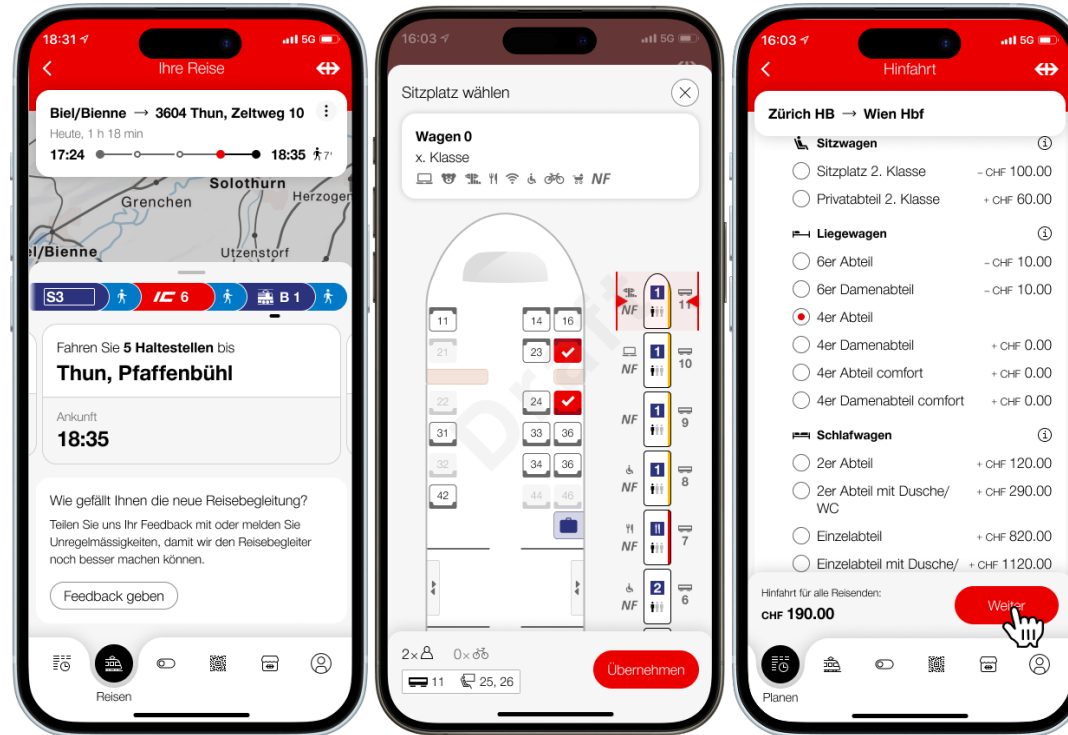
Maximum simplification of public transport travel by means of check-in/check-out, including a valid ticket for the entire GA network.

EasyRide Check-Out



Price optimization for the entire daily train rides.

Ongoing development.



New travel companion

Graphic Seat Reservation

Night trains

Ticket vending machines.



- This machine is the 4th generation with a touch screen
- This is an important pillar for self-service sales at SBB across the board, as there is at least **one ticket machine at every SBB stop.**
- Meets the demand for **anonymous travel** (non-personal ticket) and payment (cash)
- The machine complies with the BehiG requirements of the federal government *) (tactile signs, dark mode, assistance from Contact Center Brig)
- In addition to tickets, it offers a wide range of **third-party services:**
 - Western Union
 - Prepaid Mobile / Prepaid Payment Cards / Bitcoin
 - Paying bills
- Operation will be guaranteed until 2035.
- *) DDA: Disability Equality Act

Customers are choosing digital solutions. The public transport sector has responded.



Continuation of the reduction of ticket vending machines.

At stops with more than one machine, transport companies optimise the number of machines according to demand.



Transition to cashless and paperless ticket vending machines.

To save investment and operating costs, transport companies are reducing the range of functions of ticket machines. The next generation will be cashless and paperless ticket machines.

Travel centers offer personalized service and on-site advice.



- for customers who need individual support or do not want to or cannot use the digital channels.
- value-adding customer interactions (e.g. mobility advice in the event of changing mobility needs or complex products or product ranges). Digitize the remaining interactions.
- Newly renovated travel centres offer the right ambience so that customers feel comfortable.



5. Customer support.

The contact centre uses AI to automate processes.

AI technology acts as a valuable tool for travel advisers and ensures our customers receive fast and uncomplicated advice around the clock.



Use case 1: Knowledge assistant
AI as an aid to knowledge management for customer advisers.



Use case 2: Email Draft
AI as a response preparer for answering written enquiries.

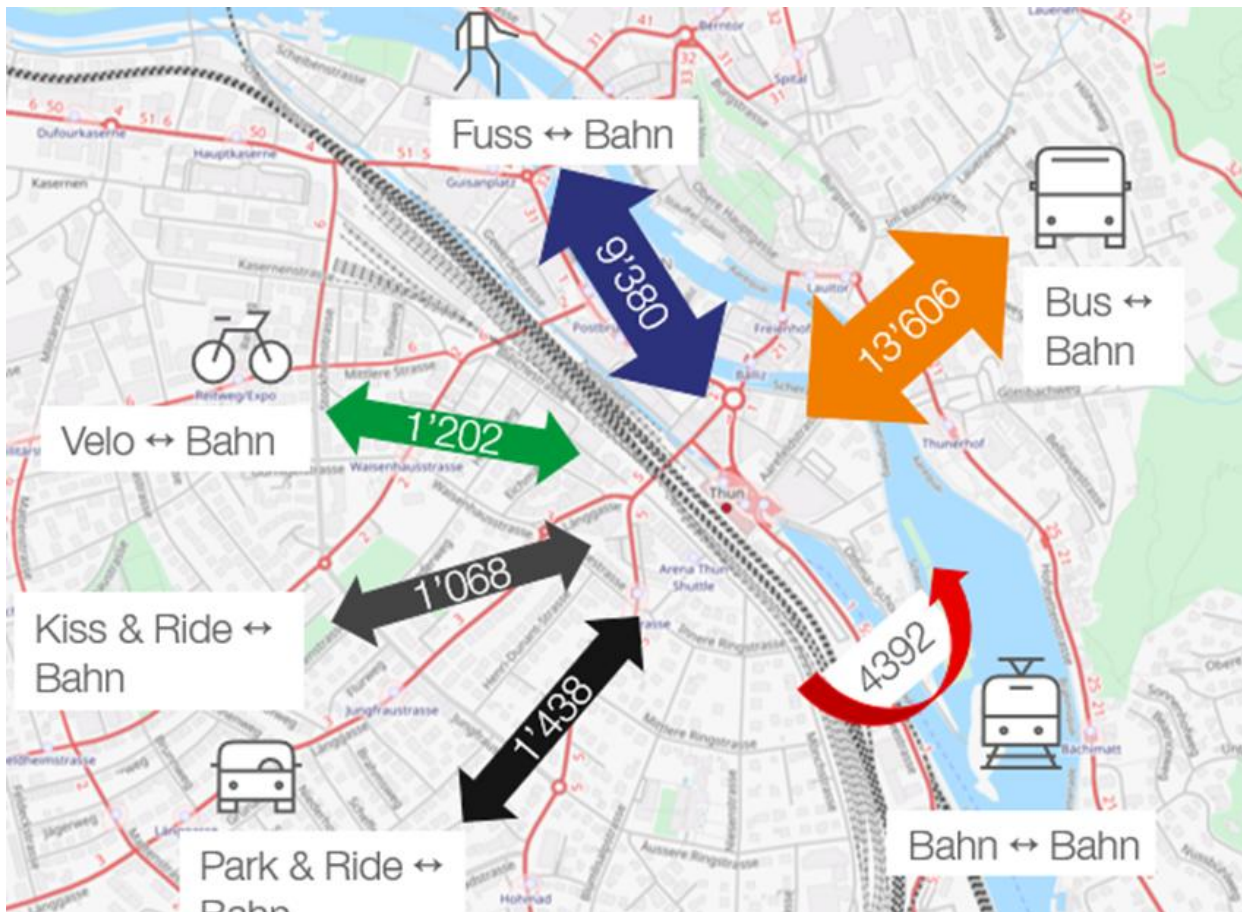


Use case 3: Chatbot
AI as a customer-facing chatbot
An application for customers.

- Aids: AI as an efficient tool in knowledge management for customer advisers.
- Personalised e-mails: instead of canned text modules, tailored and individual responses to customer concerns.
- Focus on complex customer concerns: by handling simple enquiries with AI, our customer advisers can concentrate on complex issues.
- Comprehensive response to queries: a large number of help and support requests are processed directly and efficiently by the chatbot.
- Closing knowledge gaps: AI as a supporting tool for identifying and closing knowledge gaps in customer service.

6. Integration of first and last mile.


The first and last mile also offers potential for innovation.



Intermodal connections at Thun station

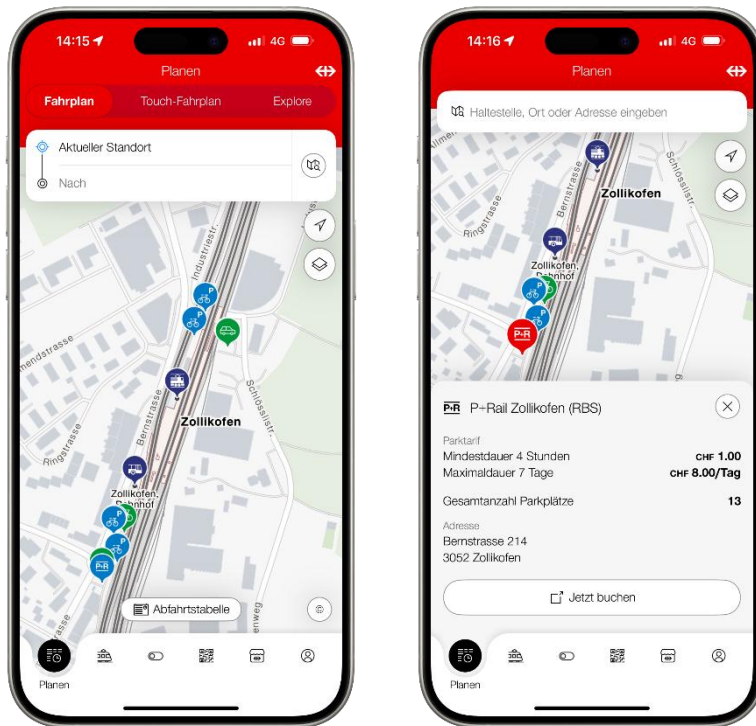
- The main transfers are bus-to-train, walking-to-train and train-to-train.
- However: Park&Ride, bicycle-to-train and kiss&ride also involve significant transfer movements.

The expansion of products on the first and last mile lays the foundation for increased use of public transport.

Parking	Sharing & Rental		On-Demand		
<p>P+Rail </p>  <p>Mit dem besten Parkplatz in Bahnhofsnähe bringen wir mehr Reisende in den Zug.</p> <ul style="list-style-type: none"> - 35'000 Autoparkplätze in Besitz der SBB - 15'000 Nutzende pro Tag.  	<p>Veloparking </p>  <p>Jede Art 2-Rad findet immer einen sicheren Parkplatz mit kurzem Weg zum Zug.</p> <ul style="list-style-type: none"> - 95'500 Veloparkplätze in SBB Besitz. - 120'000 Nutzende pro Tag.   <p>forum velostationenschweiz</p>	<p>Sharingzone </p>  <p>Alle Sharingangebote einer Stadt, immer verfügbar an der Sharingzone am Bahnhof.</p> <ul style="list-style-type: none"> - ca. 2'500 Fahrzeuge in der Schweiz. 	<p>Carsharing </p>  <p>Die Bahn und das überall verfügbare öffentliche Auto ersetzen das eigene Auto.</p> <ul style="list-style-type: none"> - 1'530 Mobility Standorte. - 1'000 Fahrzeuge an Bahnhöfen. 	<p>Bikesharing </p>  <p>Flächendeckende Bikesharing-Angebote ergänzen die Bahn in der Stadt und auf dem Land.</p> <ul style="list-style-type: none"> - Rent-a-Bike & PubliBike mit 150 bzw. 530 Stationen und 5'100 bzw. 4'500 Velos. 	<p>On-Demand </p>  <p>Mit On-Demand-Systemen öffentlichen Verkehr mit Taxi-Komfort bieten.</p> <ul style="list-style-type: none"> - Bei PostAuto z.B. 83 konzessionierte On Demand-Linien mit 350'000 Reisenden im Jahr. 

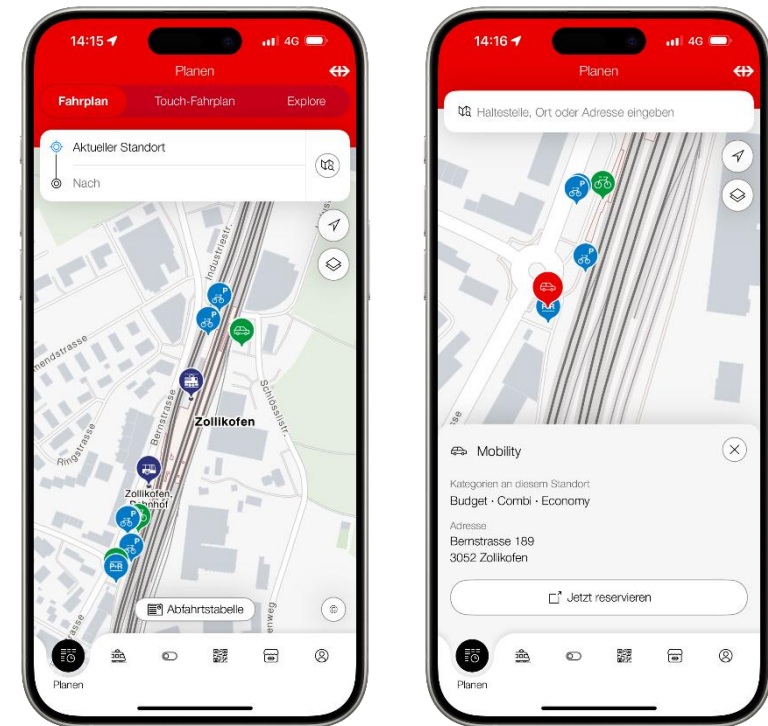
Focus on seamless connectivity and mobility: integration of parking and sharing services.

e.g. P+Rail



Visibility of P+Rail locations on the map entry page, as well as information about the service and a booking link.

e.g. Mobility



Visibility of mobility locations on the map entry page, as well as information about the offer and booking link.

7. Development to ensure future viability.

A breakthrough is needed: New "myRIDE" fare system and new Governance 3.0

"myRIDE" project:

The new smart travelcard for public transport!

- 1 Fare system (distance-dependent)
- 3 product ranges (smart subscription, regional subscription and national subscription)



"Governance 3.0" project:

Sharpening of tasks between NDV and Associations

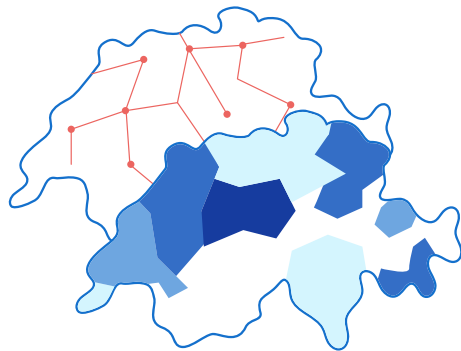
Coordinate governance between national direct transport and the 20 regional fare networks.



myRIDE reagiert auf die Bedürfnisse der Kund/-innen, der Transportunternehmen und Besteller.

Duality of tariff systems

- ! future viability



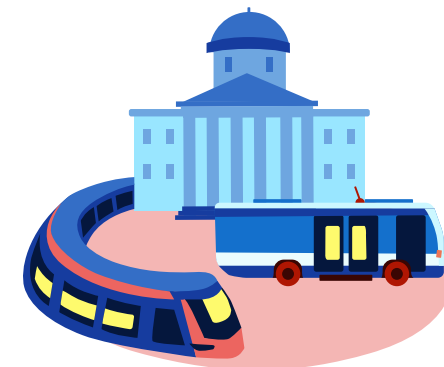
Complexity from the customer's point of view

- ! Entry hurdle
- ! Create incentives for additional trips
- ! Flexibly switch between commuting and leisure time



Requirements of the transport companies and purchasers

- ! Easy use of public transport
- ! profitability / high-yield and cost-effective system
- ! Modalshift / more public transport demand
- ! Traffic management



Conclusion.



- Even in a mass market, different customer needs must be addressed. Competition in sales supports innovation.
- Public transport consistently uses digitalisation to simplify access for our customers. In the context of public service, however, the needs of customers who are less digitally able must also be taken into account.
- Aligning infrastructure with demand peaks is too expensive. Product and pricing measures to smooth demand make sense (e.g. supersaver tickets, Half-Fare travelcard Plus instead of a flat-rate ticket).

Further reading.



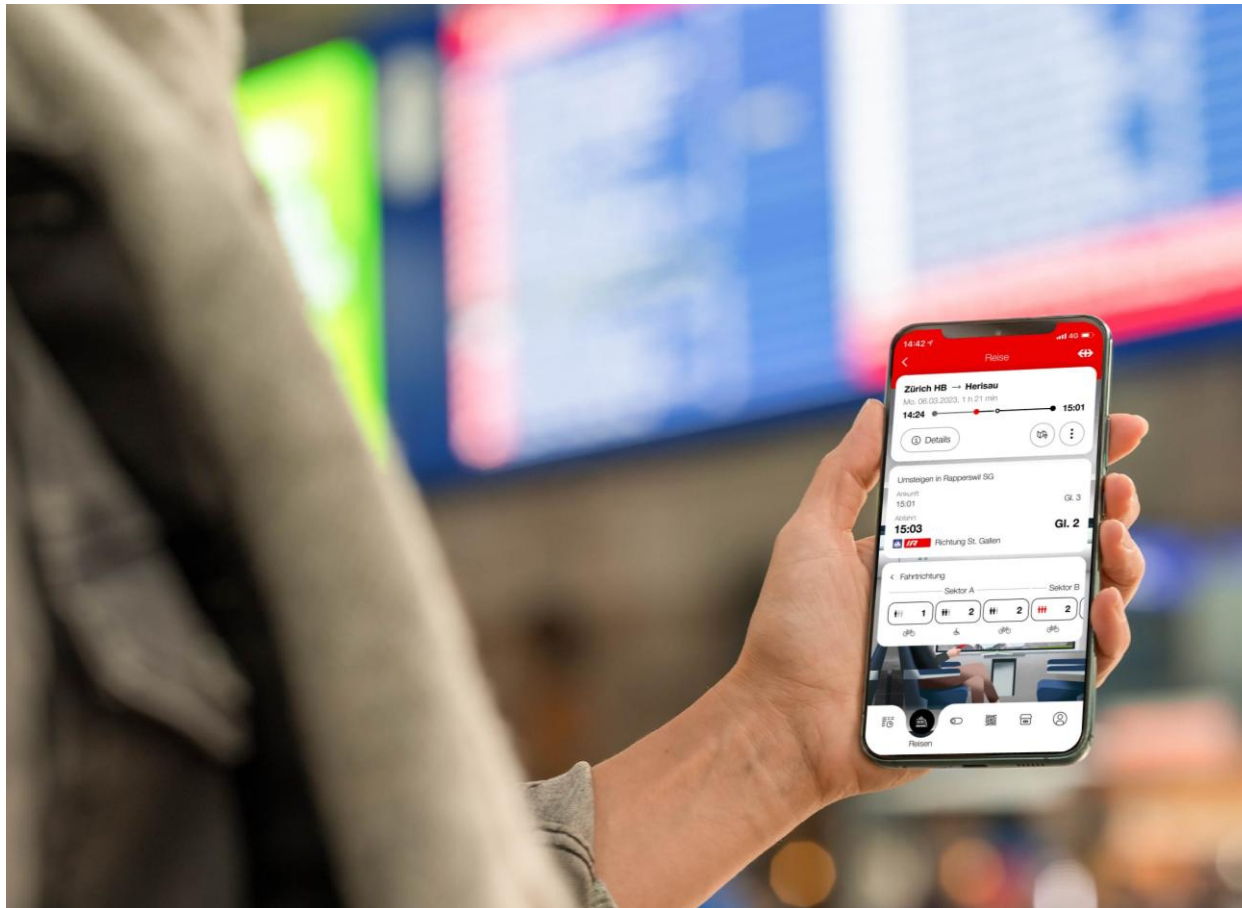
The SwissPass Alliance Handbook "The public transport industry at a glance" (excluding chapter 4-6)

You can find it on



Case customers.

Increasing the attractiveness of public transport through an improved product range and enhanced customer interaction with the existing public-transport offering.



You are a product manager for SBB Mobile and have been tasked with further developing Switzerland's most widely used public-transport app.

Tasks:

- Where do you see SBB Mobile's strengths and weaknesses?
- In which direction would you further develop the app, and based on what considerations?
- What goals would you pursue?