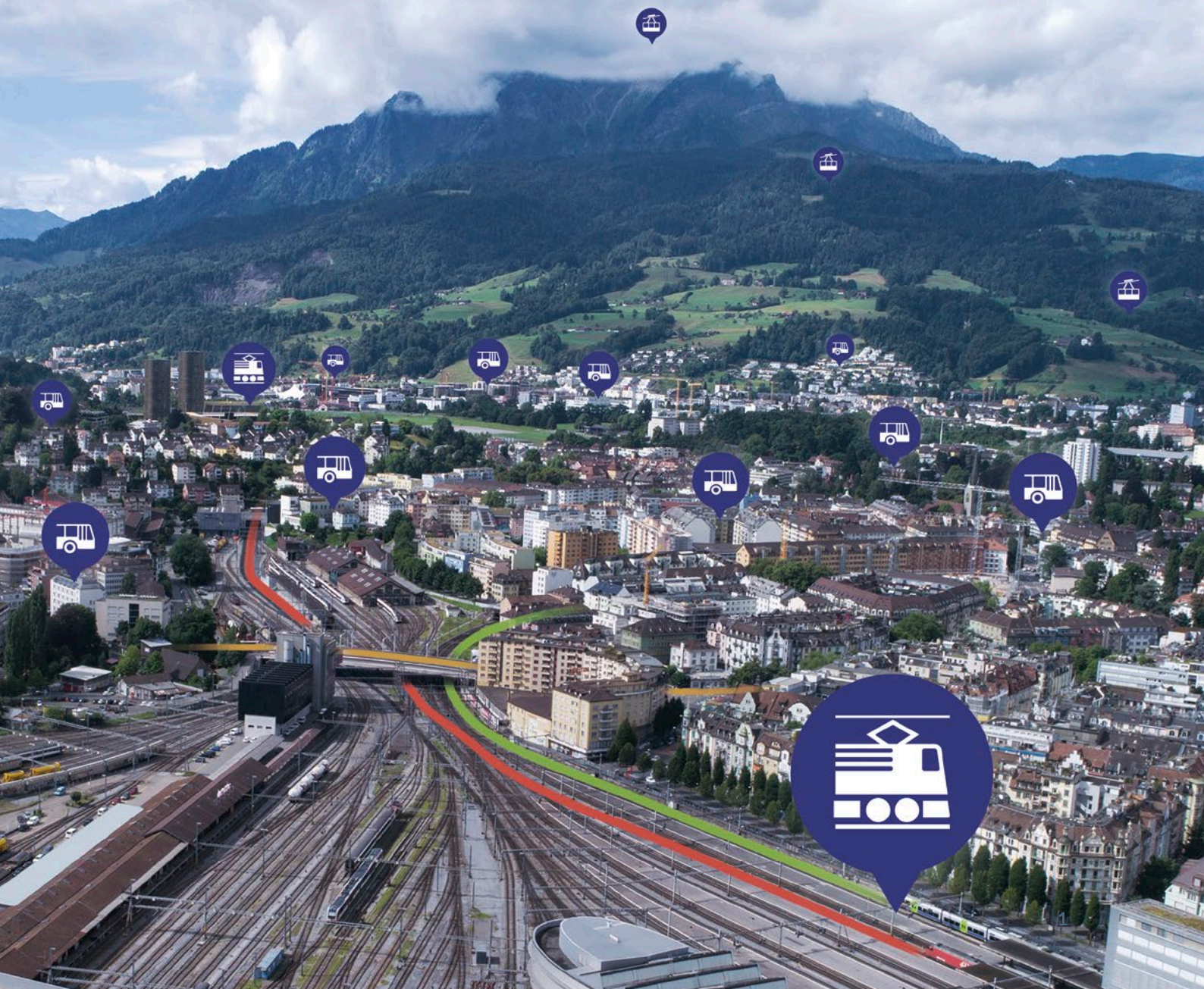
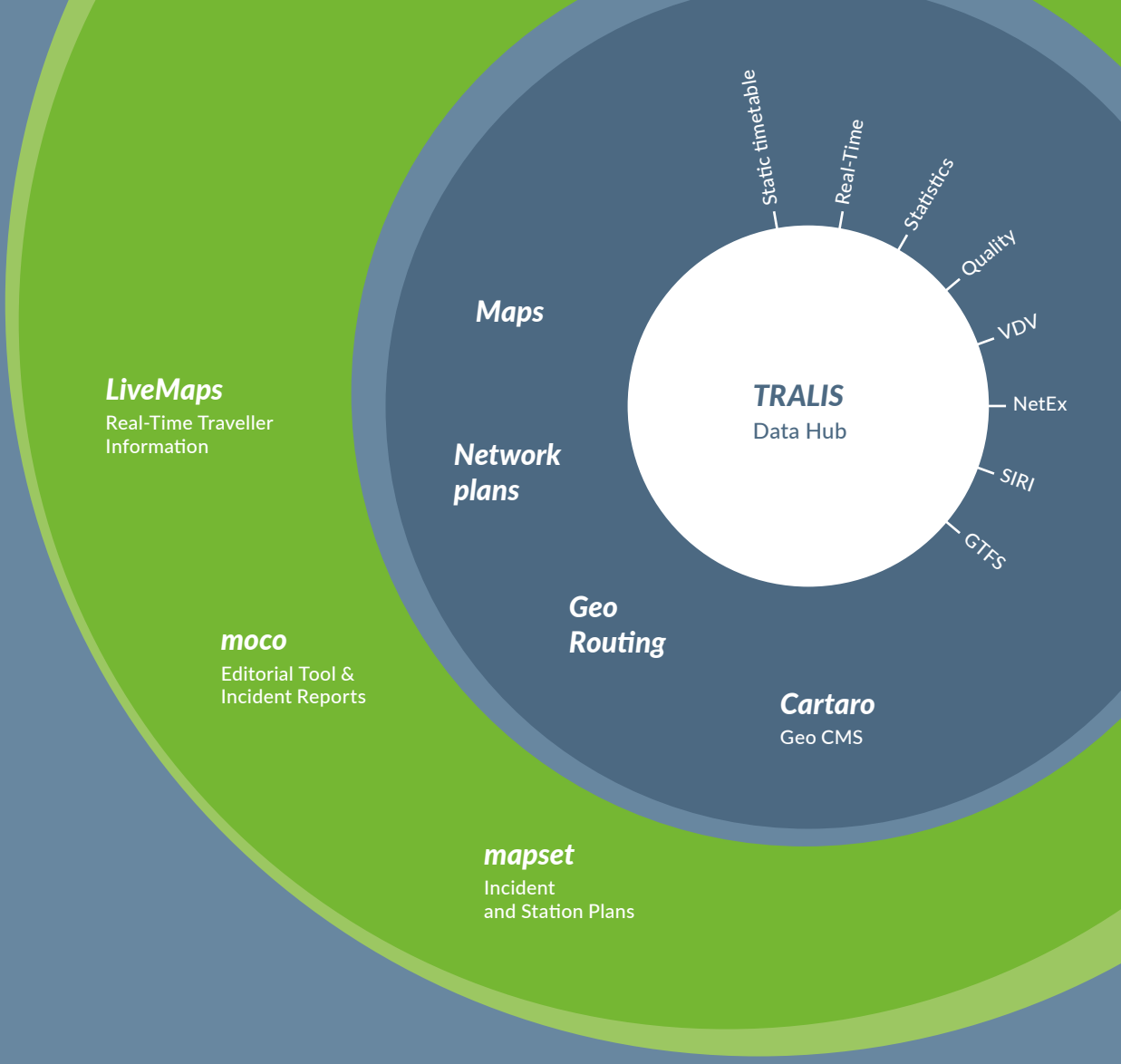
Maps and Information Systems

for Public Transport





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Travelling by public transport is comfortable, fast and sustainable. To make the journey a positive experience, good customer information is essential.

Our wide range of products offers solutions for many situations. In our apps and information systems, we link timetables and real-time data with geodata and maps. The result is maps and plans optimised for public transport, graphics and textual information that both inform the traveller transparently and make internal operational aspects clear.

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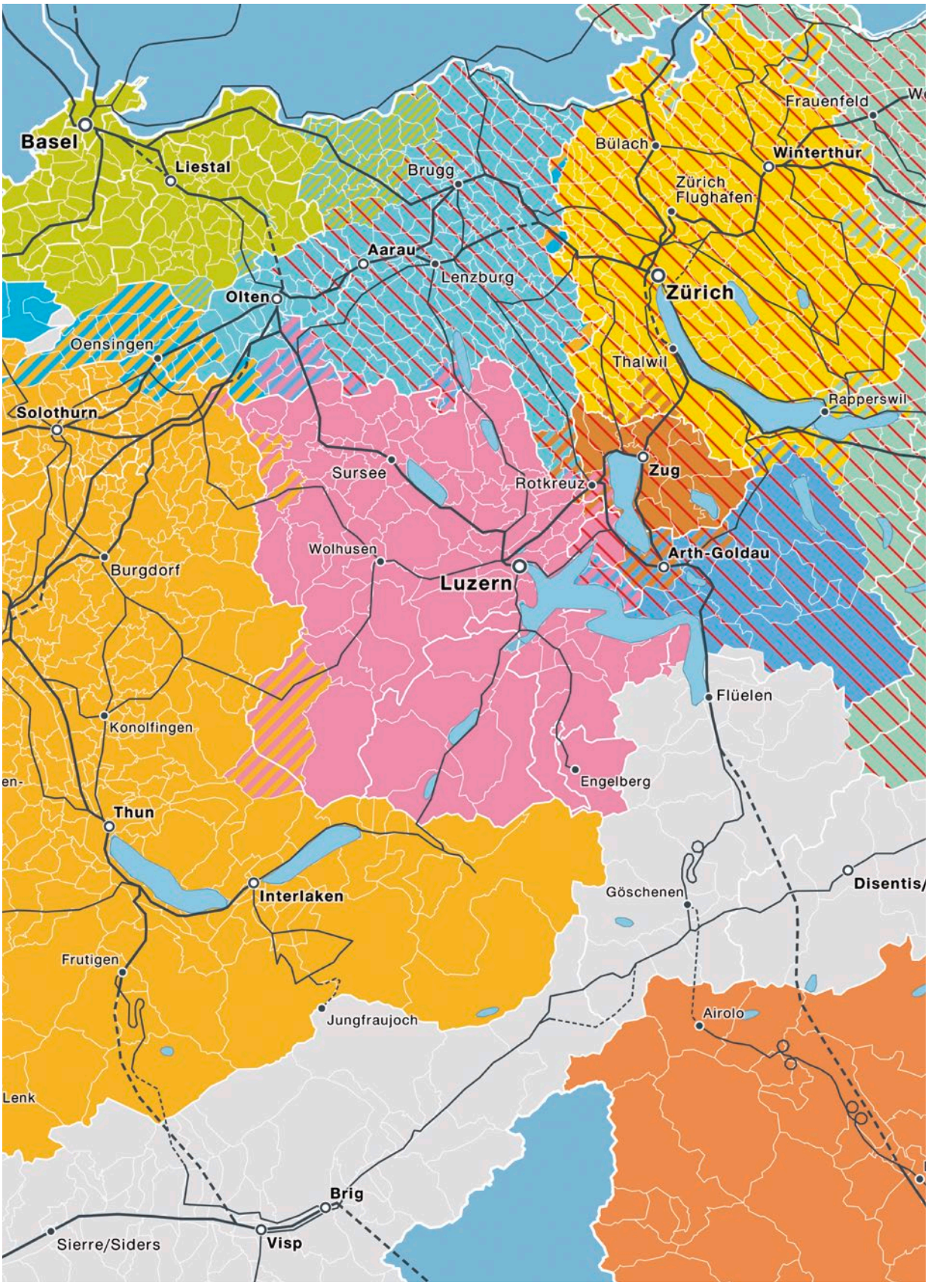


Map of the tariff associations in Switzerland.

Content

Maps

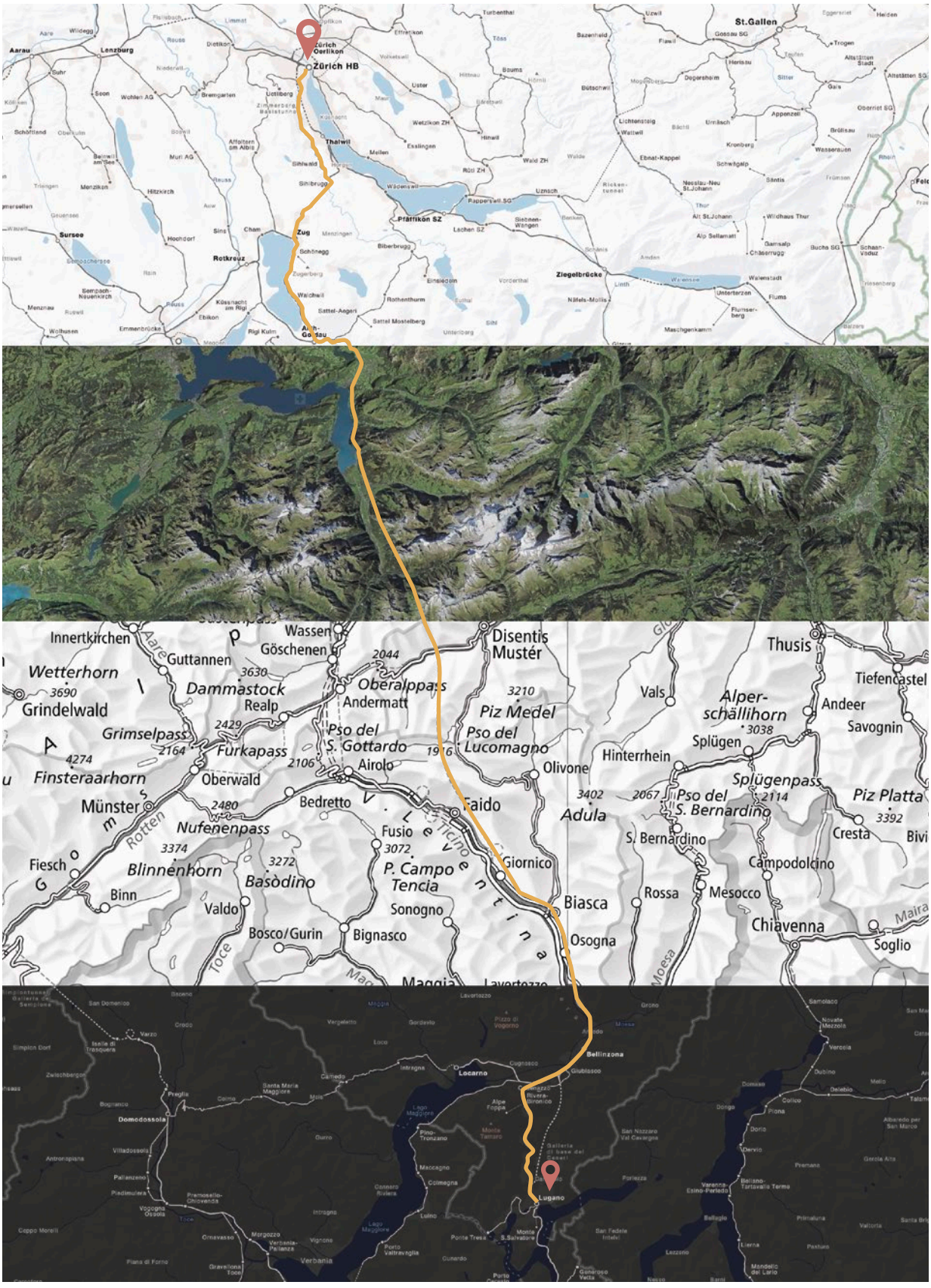
Our maps – interactive, adaptable, professional

Even before Google Maps emerged, geOps produced the first web maps. We have continuously developed our services in terms of both the technologies used and the map content. Within the framework of customer projects, we are constantly creating new, specialised maps for various thematic areas. In addition, we offer maps specially optimised for aspects of public transport and mobility. These are available both for high-quality printouts as well as a web service for dynamic integration into your software application.

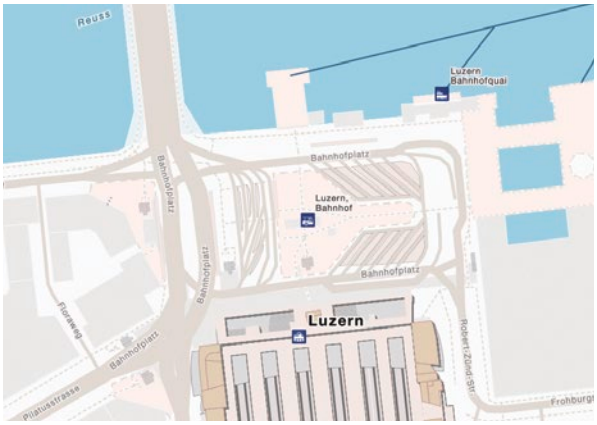
Flexible and fast with vector tiles

Our maps are based on modern Mapbox vector tiles. This technology allows high-performance map displays and provides unlimited possibilities for the styling and interactivity of the maps. While using the same base data, the maps can look very different and be optimally adapted to your corporate design or your special use case. In addition, this technology enables to create high-resolution maps for print products.

Digital steles (smart information displays) of the SBB at Däniken station with network plan and rail replacement plan.



The map style is interchangeable, the focus on public transport remains.



Our maps are suitable for all scales.

Optimised for public transport

Our maps are based on the data of the free world map OpenStreetMap. This data is specially tailored to incorporate the information important for public transport and mobility in general. In addition, we integrate data from numerous country-specific or regionally available sources in order to purposefully expand the map content with regard to the application focus.

Digital, interactive maps have always been at the centre of our activities.

In addition to a clear design, our maps are characterised by these specific contents:

- Fully mapped **stations** and **stops** with the official names and stop numbers.
- **Stop edges** as point objects as well as train, bus and tram platforms as areas – all with assignment to the correct stop.
- Display of public transport **routes** for train, bus, tram and other modes of transport.
- Intelligent filtering of **important lines** for overview maps.
- **Points of Interest** (POIs) with the offers of shared mobility.
- **Addresses** as well as entrances and passages as orientation points for door-to-door navigation.
- Important elements for **barrier-free navigation.**

Hub for timetable and real-time data

Intelligent use of timetable data

Timetable data is one of the most important aspects of public transport. However, this data only becomes really useful when a multitude of other details are intelligently linked to it. Real-time data, information on disruptions, detailed information on stops, the routes of journeys – these and other data are collected and intelligently combined in the data hub. Our data hub is a system that grows continuously with the requirements. Data structures aligned with VDV and NetEx standards serve as a basis to cover the many requirements of an information system for public transport.

In line with the breadth of information, the application possibilities are also wide-ranging.

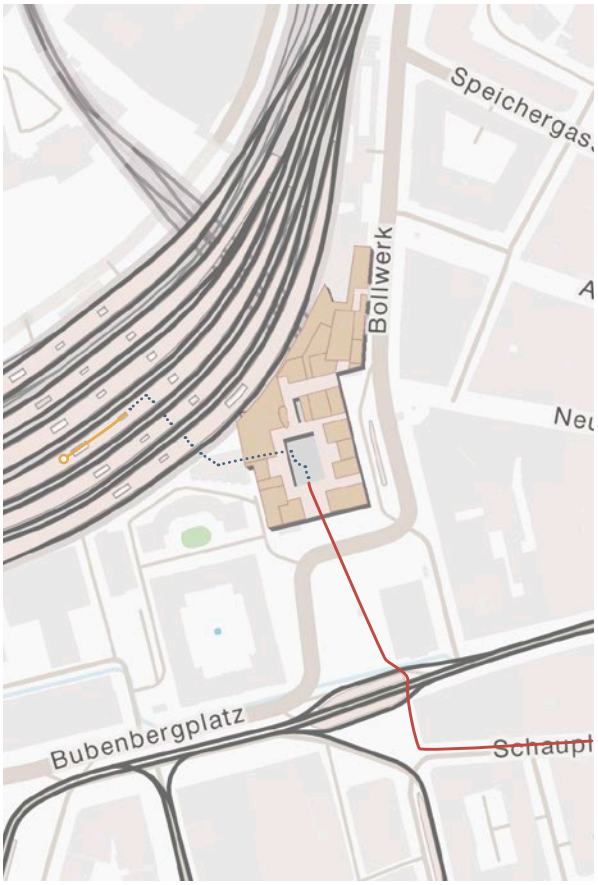
- **Passenger and disruption information –** basis for accurate passenger information in real time.
- **Live Maps –** vehicle positions based on target and real-time data.
- **Analyses and statistics –** accessibility potentials, punctuality statistics, journey performance.
- **Converters –** conversion between different proprietary and open formats (HAFAS, VDV, GTFS and many more).
- **Enrichment –** enrichment of timetable data with route progressions (shapes) or real-time data.

Turntable of the Rhätische Bahn in Landquart.

Routing

From A to B by bus, train or on foot

Finding the exact route from A to B is no problem today – as long as you are travelling by car. The situation is different if you need the route of a bus or train, or if you are travelling on foot inside a station. With our routing service, we support a wide range of modes of transport. For public transport vehicles in particular, we deliver better results than any other service. We can offer this quality because the routing is done on richly attributed data of the railway, road and footpath networks and applies sophisticated heuristics.



Pedestrian routing inside and outside buildings.

Suitable for any level of detail

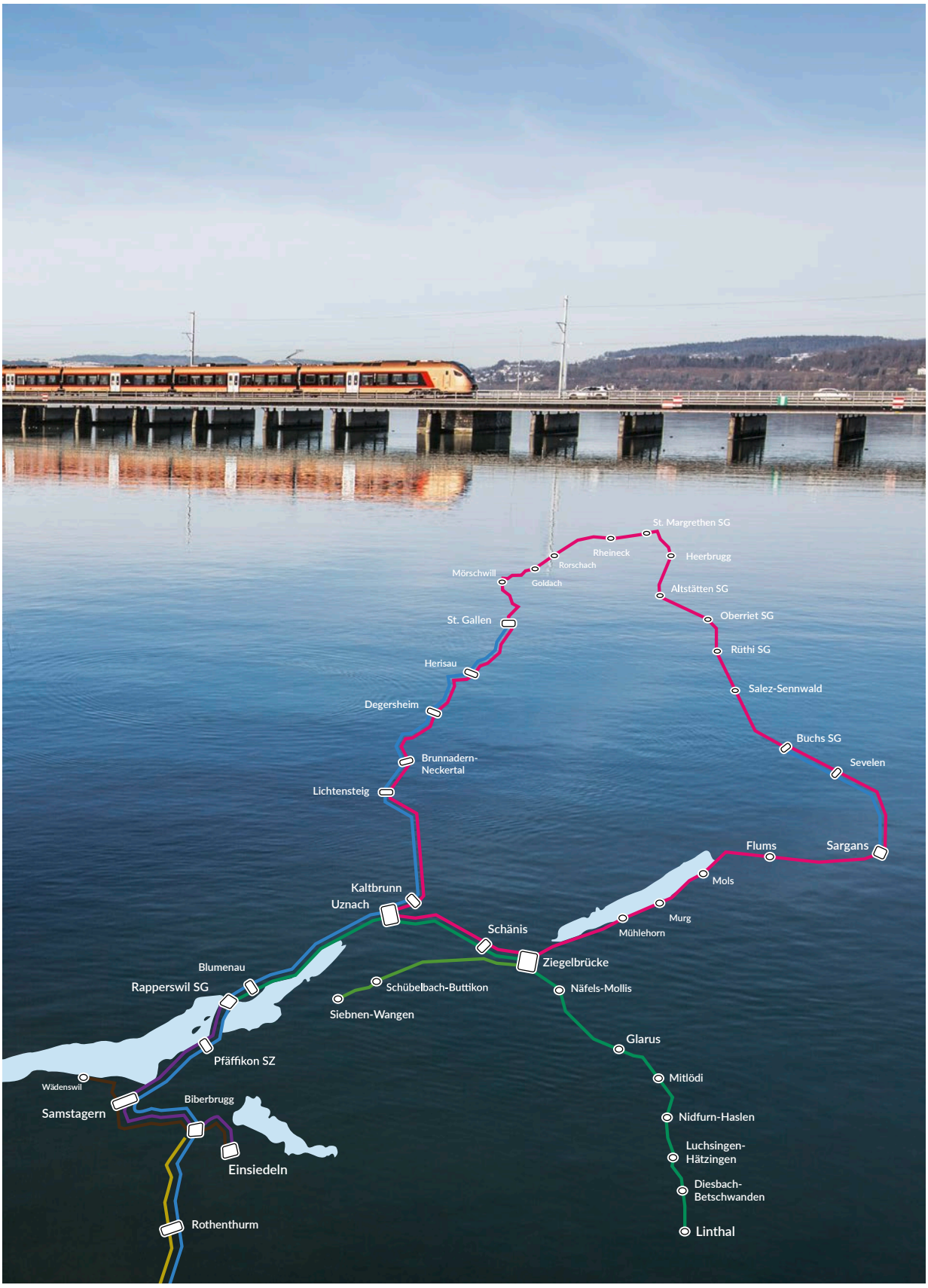
The routing is adapted to our maps. For long routes used in small-scale overviews, the routes are simplified ("generalised") to exactly the same degree as in the maps, so that they fit exactly on the map background. Close-up views render very detailed routes, calculated precisely down to individual tracks in the station.

Our routing is used for numerous projects. For example, the routes in our live maps are calculated using it. The Swiss Federal Railways (SBB) use it for trains, trams, buses and cable cars to display detailed information to passengers about the course of their journey. Routing is also available in mapset, our online tool for creating situation plans, to simplify the addition of routes into the plan.

Routes with additional information

Accurate routes also have the potential for detailed analysis. On this basis, we offer, for example, exact height profiles or counts of objects such as railway crossings, traffic lights or pedestrian crossings along the route. The analyses can be specifically adapted to your requirements.

Zurich HB with edge-to-edge routing of train, footpath and bus.



Voralpen-Express near Rapperswil with topographical network plan of SOB.

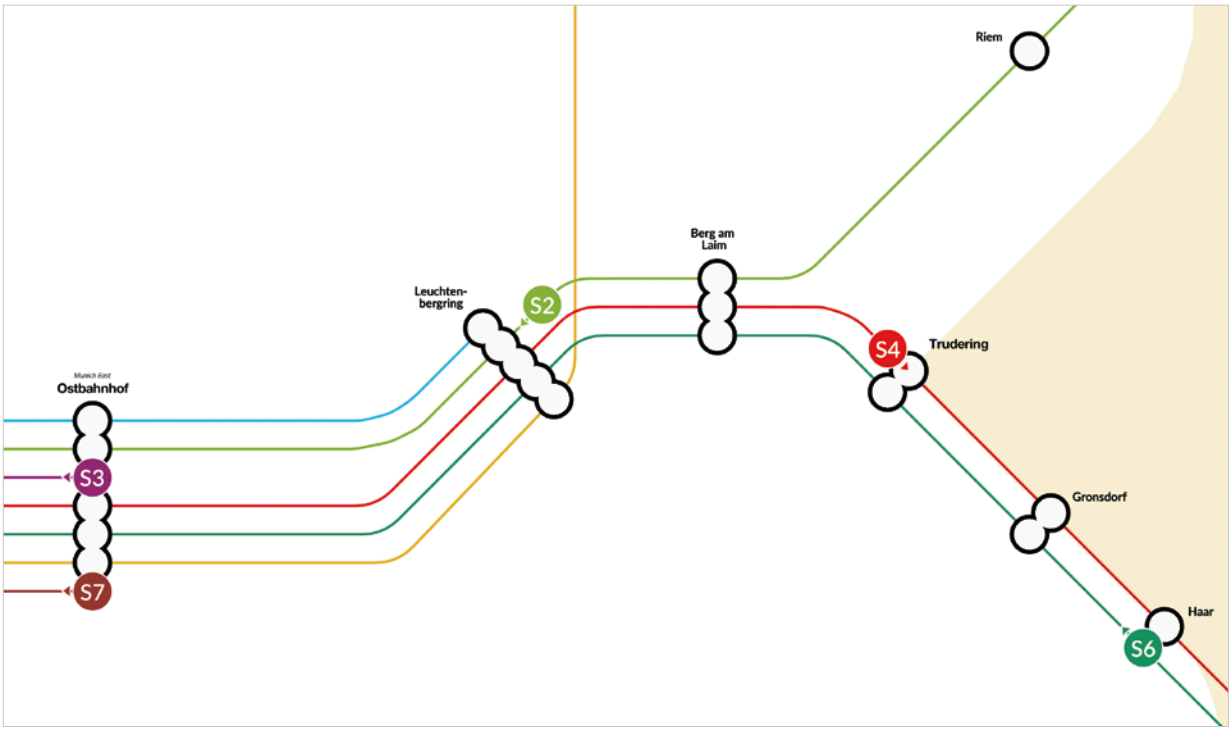
Network plans

Passenger information has many facets

On the one hand, there is personalised information, i.e. connections selected according to specific wishes with support for the multi-modal travel chain. With our routing and map services, we offer the precise visualisation of travel routes for this view, as well as options for navigation. On the other hand, there are network plans. They help travellers get an overview of the public transport offer and to develop an idea of possible travel routes, independent of a concrete connection request.

Overview of public transport services

Network plans cover different areas of the overall offer. They can vary depending on regions, operators, modes of transport, day and night networks or other criteria. In the case of topographic network plans, the location of the lines is closely oriented to reality, whereas schematic plans are more or less abstracted in order to emphasise the connections between the lines and stations more clearly.



Schematic network plan of S-Bahn Munich as the basis of a live map.

Schematic network plan of Freiburg im Breisgau.

Automated creation

Our network plans are for the most part calculated automatically. The basis for the calculation is usually timetable data, which can be filtered according to the criteria listed above. The automatisms produce graphical illustrations, which classically show lines in different colours. In addition, a topological network of nodes and edges is also created, which has great potential for intelligent, dynamic representations. For example, our network plans can be used as the basis for real-time visualisations, such as those we operate for the suburban railways in Munich and Hamburg.

They can also be used to display disruptions or operating characteristics such as the frequency on the lines. The main advantage of automatically generated plans is that they can be updated at short notice and at low cost whenever the underlying data require it, e.g. due to timetable changes.

With the network plan, the traveller can quickly gain an overview of the entire network and thus quickly reach his or her destination.

Topographic network plan of Freiburg im Breisgau.

Basel SBB station with real-time data of trains, buses and trams.

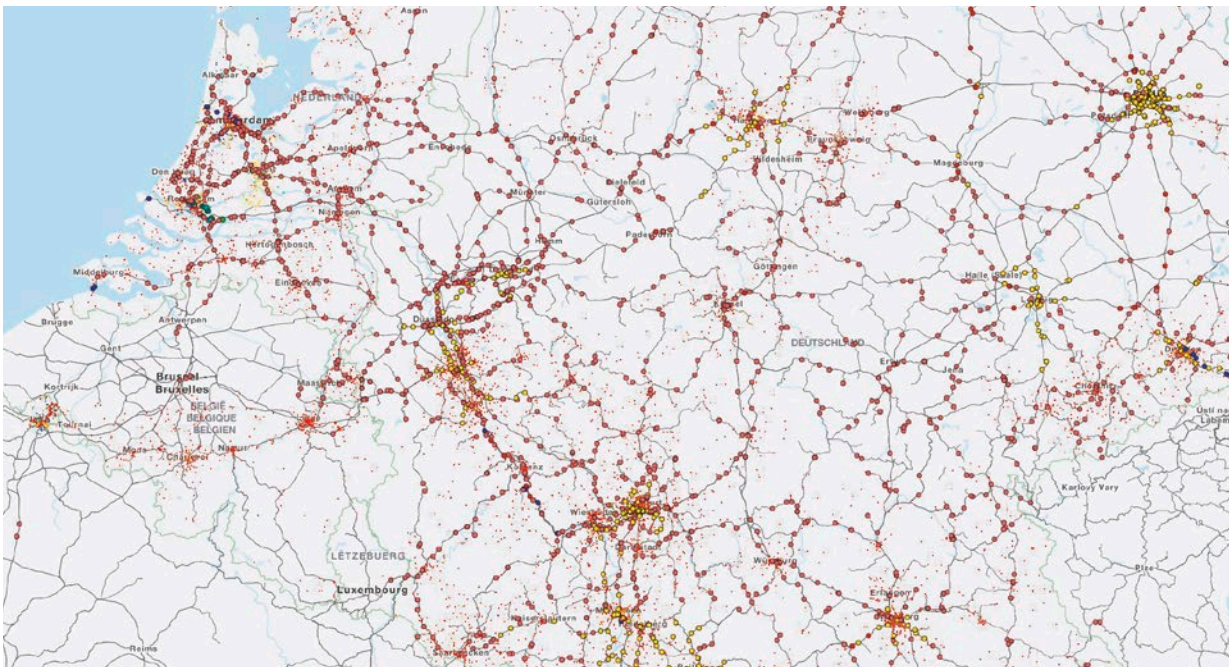
Live maps

Live maps show the positions of vehicles on a map. Displaying them enables the presentation of various aspects of public transport in a particularly expressive manner.

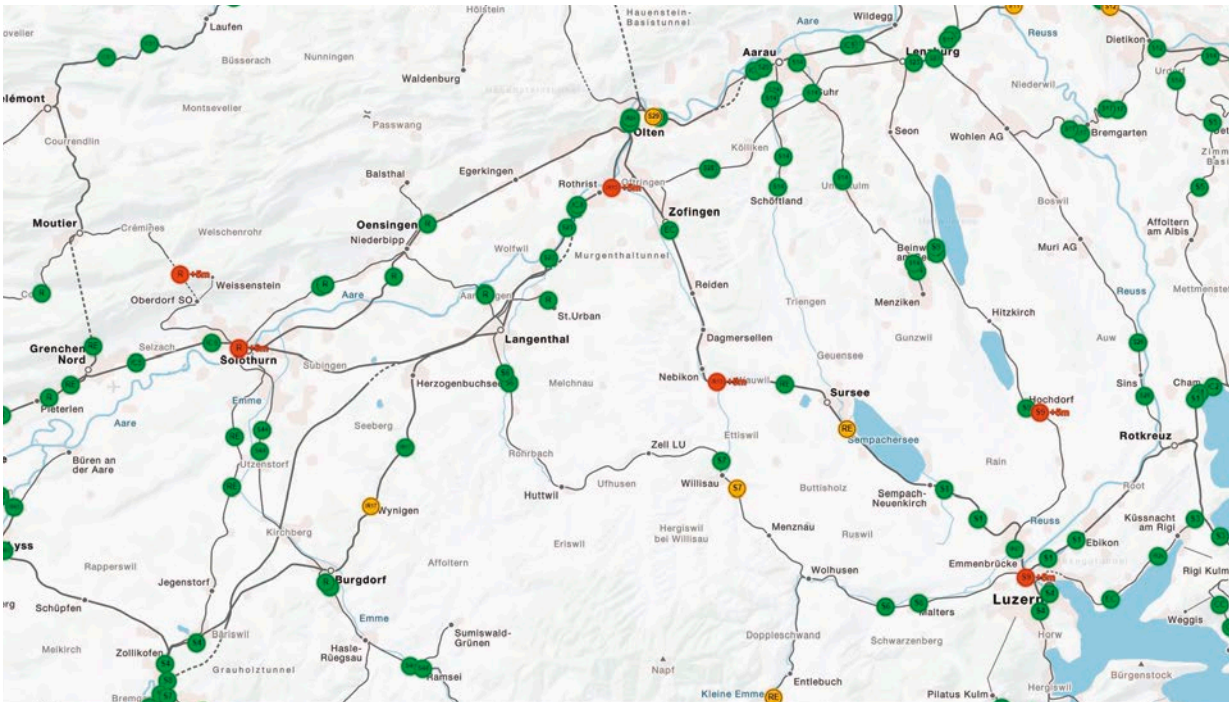
Visualisation of the public transport offer

In the basic version, vehicle positions are extrapolated on the basis of the target timetable, i.e. the timetable service planned for the medium and long term. Train delays, cancellations or diversions are ignored. The resulting representations are only conditionally suitable as passenger information, but can provide a good overview of the public transport offer. These approaches are also popular with planners, as different scenarios can be visualised. Our globally available representation of public transport on tracker.geops.ch is largely based on target data.

When will my train arrive? Which areas are particularly busy? Live maps help with passenger information and planning.



Worldwide display of vehicle positions at tracker.geops.ch.



Punctuality of public transport in Switzerland.

Representation of punctuality

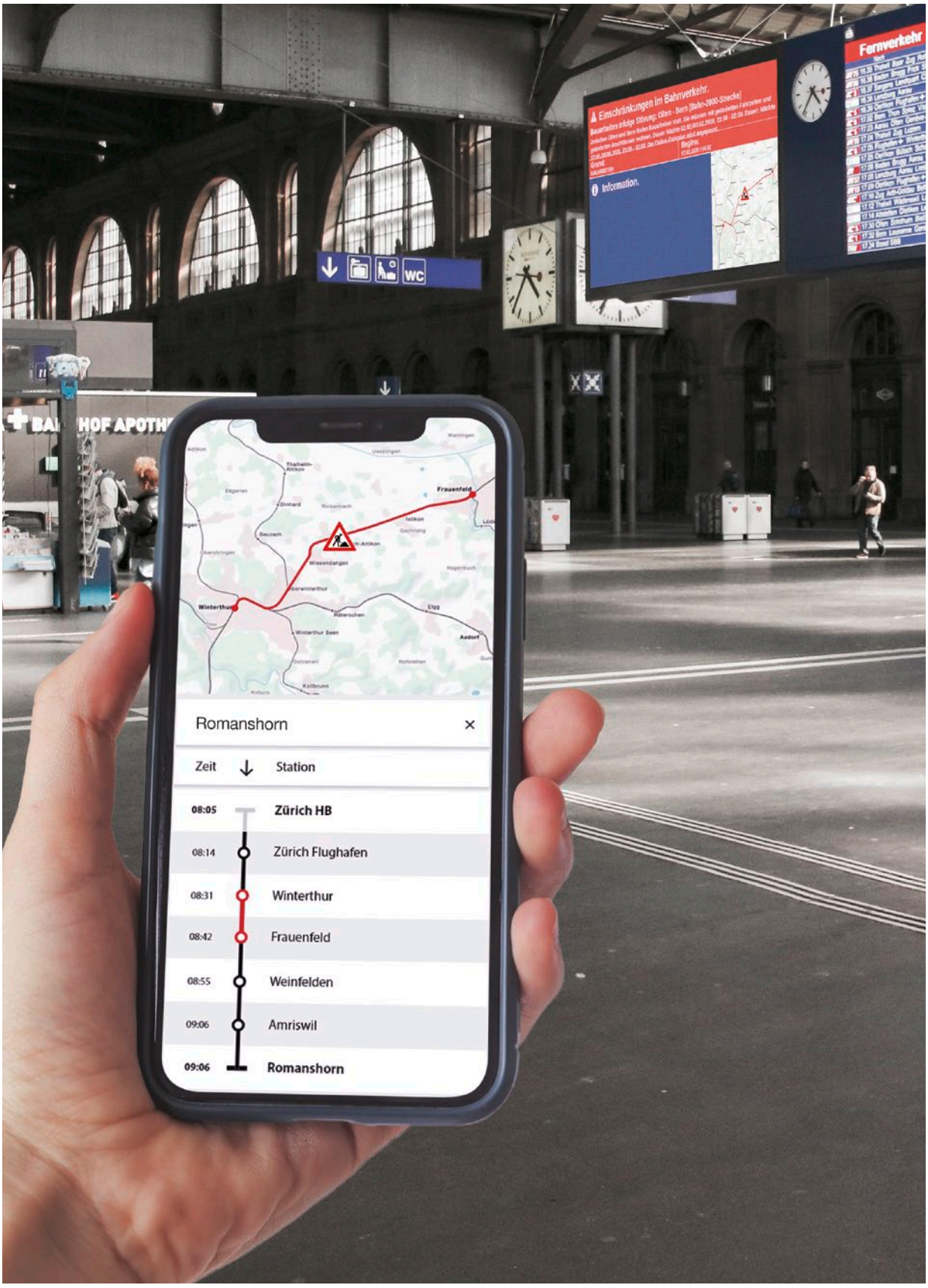
Solutions that consider continuously updated deviations from the scheduled arrival and departure times or information on cancellations and diversions, i.e. the real-time or actual timetable data, go one step further in depicting the actual situation. This representation of real-time or actual timetable data brings the map very close to reality. A good example of a live map is the punctuality map, which can be found on the SBB web map portal at *maps.trafimage.ch*.

Real-time maps and departure boards

Live maps produce their greatest added value when, in addition to the target timetable and the forecast deviations, the actual position of the vehicles is taken into account. Our solutions are able to combine these three sources of information.

Vehicle positions from GPS receivers or other positioning systems are not only used to display the position of the vehicles on the map as precisely as possible, but they are also used to validate the forecasts from the control centre. Among other applications, our system makes an important contribution to customer information in the official apps of the suburban railways in Munich and Hamburg.

The official app of S-Bahn Munich with real-time map and departure boards.



Continuous incident communication from the mobile phone to the monitor at the station.

Incident and construction site communication

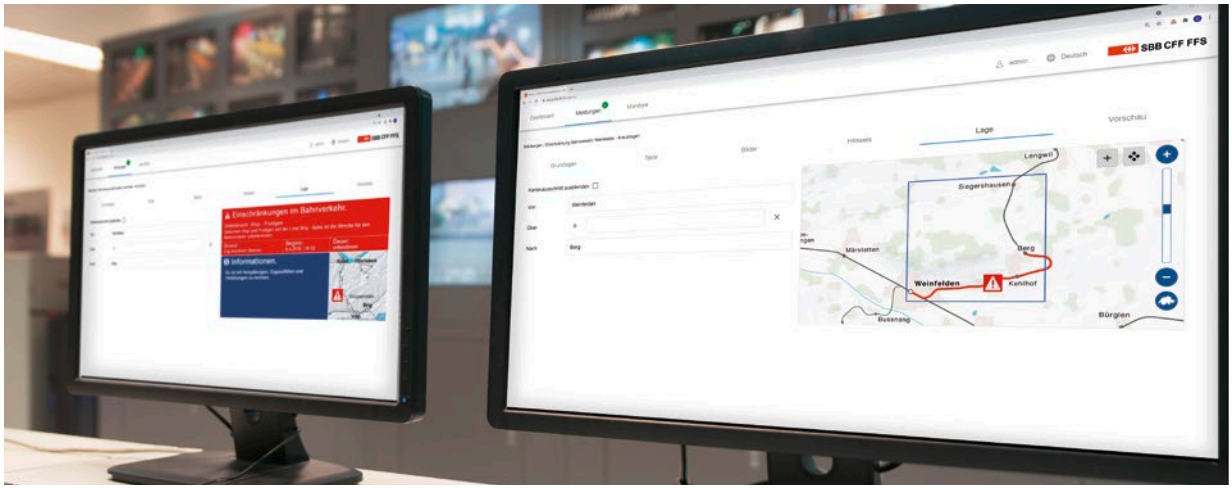
Quickly and clearly informed

The better the public transport offer the higher the risk of disruption. Dense frequency sequences, short coupling and transfer times, a heavily loaded infrastructure and the need for construction measures make the system vulnerable. Restrictions in the operational flow, whether planned or unplanned, are therefore unavoidable. It is therefore all the more important to provide information to travellers about deviations and alternative travel options.

Modular system for passenger information

The requirement to inform travellers quickly and accurately about deviations from regular operations cannot be achieved with an isolated solution. Rather, data from existing passenger information systems must be used and coordinated with each other. An editorial revision of the existing data is often indispensable. Subsequently, the information must be output in a targeted manner on a wide variety of channels such as apps and websites, vehicle displays or monitors at the station.

Thanks to our many years of work in the field of public transport, we have a whole toolbox at our disposal for this. Our data hub for timetable data has the necessary interfaces to read in basic data from existing information systems and process it in a structured manner. With our flexible editing tools, this information can be refined and expanded. Furthermore, an integrated map editor enables creating maps of the location of a construction site or disruption, as well as the course of the rail replacement, almost entirely automatically. An array of interfaces allows the information to be output on all channels.



Editorial tool to control the disruption information on the SBB monitors.

mapset

Do-it-yourself plans

You want to make up-to-date and attractive public transport information available to your customers? mapset allows you to easily create clear and visually appealing plan graphics. No software needs to be installed for mapset, the editor is simply used via the internet in your web-browser. With just a few clicks you can visualise plans for changed stops, rail replacement services, communicate the situation during construction projects, ensure customer guidance at events or provide information on special operational situations on site. All this is based on map images that are tailored to the needs of public transport companies.

mapset is purchased via a subscription model. You can find all information about prices, functionality and advantages of mapset on our website *mapset.ch*. Here you also have the opportunity to try out mapset in a demo without registering and to test it extensively.

www.mapset.io

User interface of the online editor mapset.

Our solutions in use at SBB

Our solutions are used by numerous transport companies. The Swiss Federal Railways (SBB) make particularly extensive use of our offers for customer information as well as for internal purposes.

The Trafimage system

Under the name Trafimage, the most comprehensive set of maps of public transport in Switzerland is provided with the route networks of all modes of transport. Every year, more than 300 maps and plans are published in digital and analogue form – from detailed station maps and overview maps for passengers to maps with internal topics. The maps and plans help guide SBB customers in the station and on the trains and are available on the web at *sbb.ch* and *trafimage.ch*. In a joint venture with the graphics agency evoq, geOps is responsible for the operation and further development of Trafimage on behalf of SBB.

Route networks of all modes of transport

The basis for all maps is our data hub with current timetable data as well as various geographical base data. The network derived from this is processed with GIS tools developed in-house and graphically optimised by means of generalisation. The network has a consistent topology, i.e. it is suitable for mapping all circumstances, which are either linked to routes between two stops or to the kilometres along the route.

For the display of departure times and for the visualisation of SBB punctuality, both the interactive station plan and our web maps access our real-time service with current train positions and delay information.

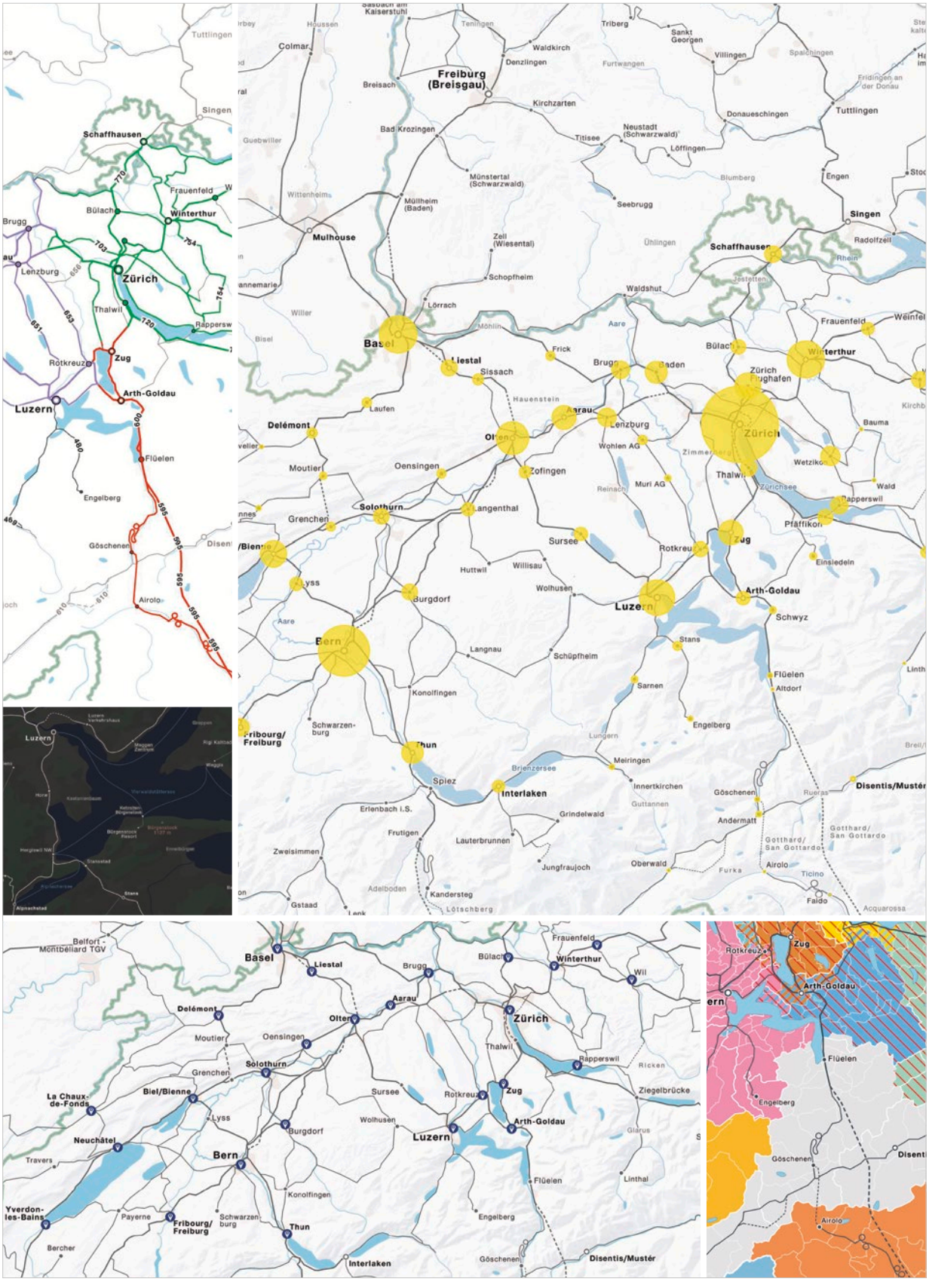
Editorially enriched maps and plans

The contents of numerous thematic Trafimage maps are captured and managed with our GeoCMS Cartaro. Among others, maps on travelling with reduced mobility and on SBB construction projects are based on Cartaro. The SBB's specialised departments also use this editing tool, e.g. to find the right person responsible for a section of line throughout Switzerland.

At the same time, Cartaro is the central platform for maintaining information on offers at the 35 largest Swiss railway stations. Opening hours, logos, images and other content are managed in the GeoCMS by the SBB property managers and our graphics partner evoq. The data forms the basis for online and offline plans and for the offer pages on the SBB website.

Trafimage – consistent systematics for public transport in Switzerland.

Interactive station plan for on-site orientation.



Thematic maps on the SBB portal at maps.trafimage.ch.

Incident and construction site communication

SBB uses our passenger information tools to inform its customers about disruptions and interruptions on general displays. To ensure the smooth provision of the information, our system extracts available messages from existing systems, such as HIM. The information, which is broken down into relevant text blocks, and the automatically generated overview map are then checked and enriched by staff in the SBB Operation Centres and published on the general displays.

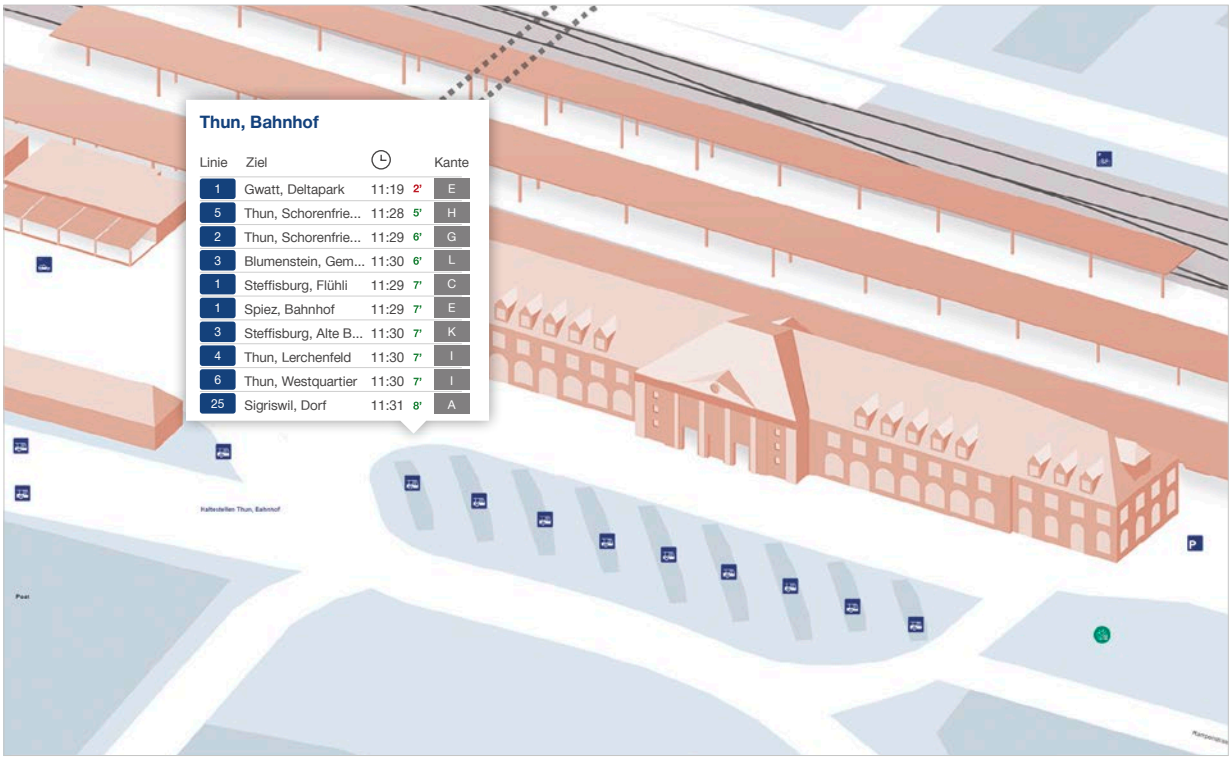
With the help of our online editor mapset, SBB informs its customers about construction sites at stations, rail replacement and other special situations. Printed on posters or dynamically embedded into existing websites, the clearly laid-out maps help to guide customers at the station.

On the right track

When buying tickets at the SBB counter or via the website, our routing is used to visualise the planned travel route. All relevant means of transport are taken into account. When creating situation plans, our footpath routing also helps to find the shortest route at and inside the station.

Maps and plans for all public transport

To enable a uniform appearance of public transport in Switzerland, the maps and plans produced in the Trafimage system for SBB are also freely available for other providers. In this way, further informative maps and plans on the subject of mobility can be derived from the existing maps. Adaptations are permitted within the framework of copyright and are possible with simple online tools. Own editorial content can be added to the maps using the GeoCMS Cartaro.



The interactive station plan combines clear graphics with detailed information about the offers at the station.

Our services

Maps

- *Application development with web maps*
- *Provision of maps as a web service for your existing applications*
- *Efficient and, if required, automated creation of print maps*
- *Design and provision of customised map styles*
- *Solutions for individual map content*
- *Editing tool for independent management of thematic content*

Hub for timetable and real-time data

- *Conversion between numerous formats such as various VDV standards, NetEx, SIRI, GTFS*
- *One-time conversion or provision of web services*
- *Enrichment of timetable data with route progressions*
- *Analyses, such as accessibility or journey times based on the timetable*
- *Services for numerous passenger information systems*

Routing

- *Supplementing timetable data with exact route progressions*
- *Provision of a service for route progressions of many modes of transport*
- *Supplementing connection queries with door-to-door navigation*
- *Analyses of route characteristics, e.g. elevation profiles*
- *Planning for vehicle operations*
- *GPS matching on routes*

Live maps

- *Visualisation of vehicles on maps and plans*
- *Mapping of timetable scenarios*
- *Individual symbolisation, e.g. according to punctuality, capacity utilisation, vehicle types*
- *Integration of your individual data into the basic version on the basis of the target timetable*
- *Solutions for use in comprehensive information systems*
- *GPS matching for vehicles*
- *Individual application development*

Network plans

- *Fully or partially automated creation of schematic and topographic network plans*
- *Adaptations to individual designs*
- *Manual graphical optimisation on request*
- *Fully automated updating of plan creation*
- *Setup of web services for the delivery of the plans*
- *Individual configuration of the information to be displayed*
- *Integration with other services such as our live maps*

Incident and construction site communication

- *Stand-alone systems for customer information in the event of disruptions*
- *Integration with existing passenger information systems*
- *Web services for integration into existing systems*
- *Display as a string of nodes or departure boards as well as on maps and network plans*
- *Evaluation of existing services such as HIM*
- *Output optimised for web applications, apps or monitors in trains and stations*

mapset

- *Web-based editor for public transport plans*
- *Use via the internet web-browser without software installation*
- *Map base data optimised for public transport and continuously updated*
- *Output as interactive web maps or for high-resolution printing*
- *Available on a subscription basis*

SBB Trafimage maps and plans

All the services listed above can be used together with the maps and station plans of the Trafimage system. The rights of use are free of charge. We will be happy to advise you on how best to use this service for your purposes.

Convince yourself

Link collection

You can test our services live online. The following links provide an overview of selected areas of application.

- Our website *geops.ch*
- geOps map portal *mobility.portal.geops.io*
- Routing demo *routing-demo.geops.io*
- SBB map portal *maps.trafimage.ch*
- SBB construction projects *company.sbb.ch/de/ueber-die-sbb/projekte/karte.html*
- Tariff network map of Switzerland *maps2.trafimage.ch/ch.sbb.tarifverbundkarte.public*
- Station plans of the SBB *plans.trafimage.ch*
- Station plans on *sbb.ch/de/bahnhof-services*
- Live Map S-Bahn München *s-bahn-muenchen-live.de*
- geOps newsletter *geops.ch/newsletter*
- Online editor mapset *mapset.io*
- mapset-Newsletter *geops.sh/mapset*
- Developer Portal *developer.geops.io*

No time to type?
At geops.ch/en/blog/print you will find all the links to click on.

Developer Portal

Our Developer Portal offers a toolbox for applications in public transport and mobility in general. The tools include open source software libraries as well as application programming interfaces (API) inspired by the experience of many projects for transport operators. An important focus is on spatial information specifically optimised for the needs of public transport. Results are APIs for maps that particularly highlight features of public transport, or APIs that visualise the exact course of a train or bus route or track the real-time positions of vehicles. All functions are available free of charge for testing purposes. Software libraries with which the APIs can be easily used are completely free – as open source. In the documentation of the software you will also find numerous examples of possible applications.

Get in touch with us!

We will gladly advise you personally on your requests.

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