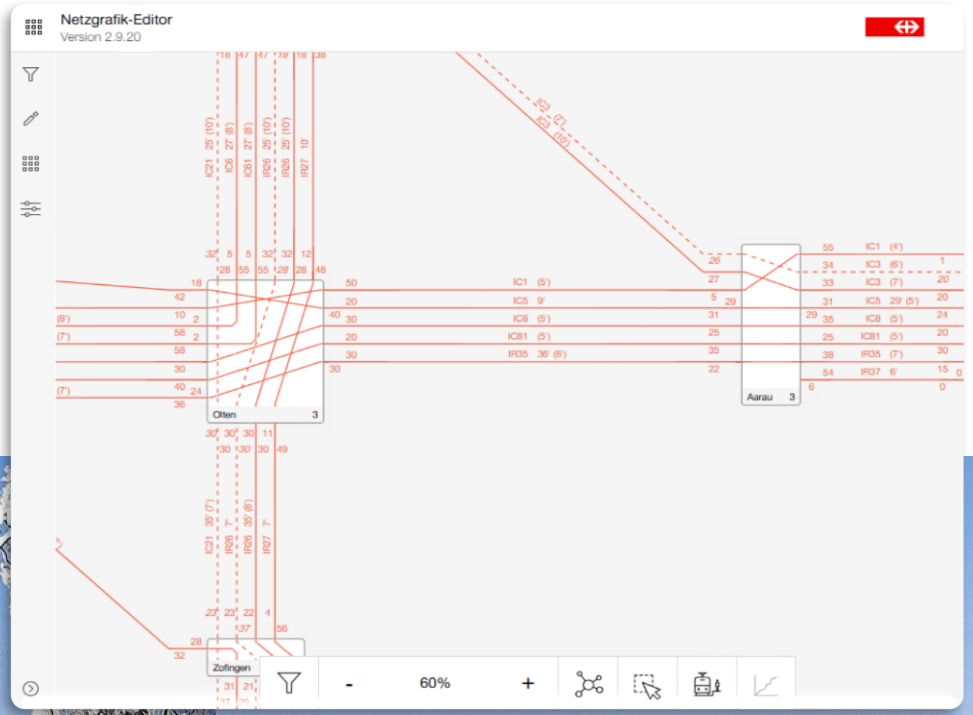
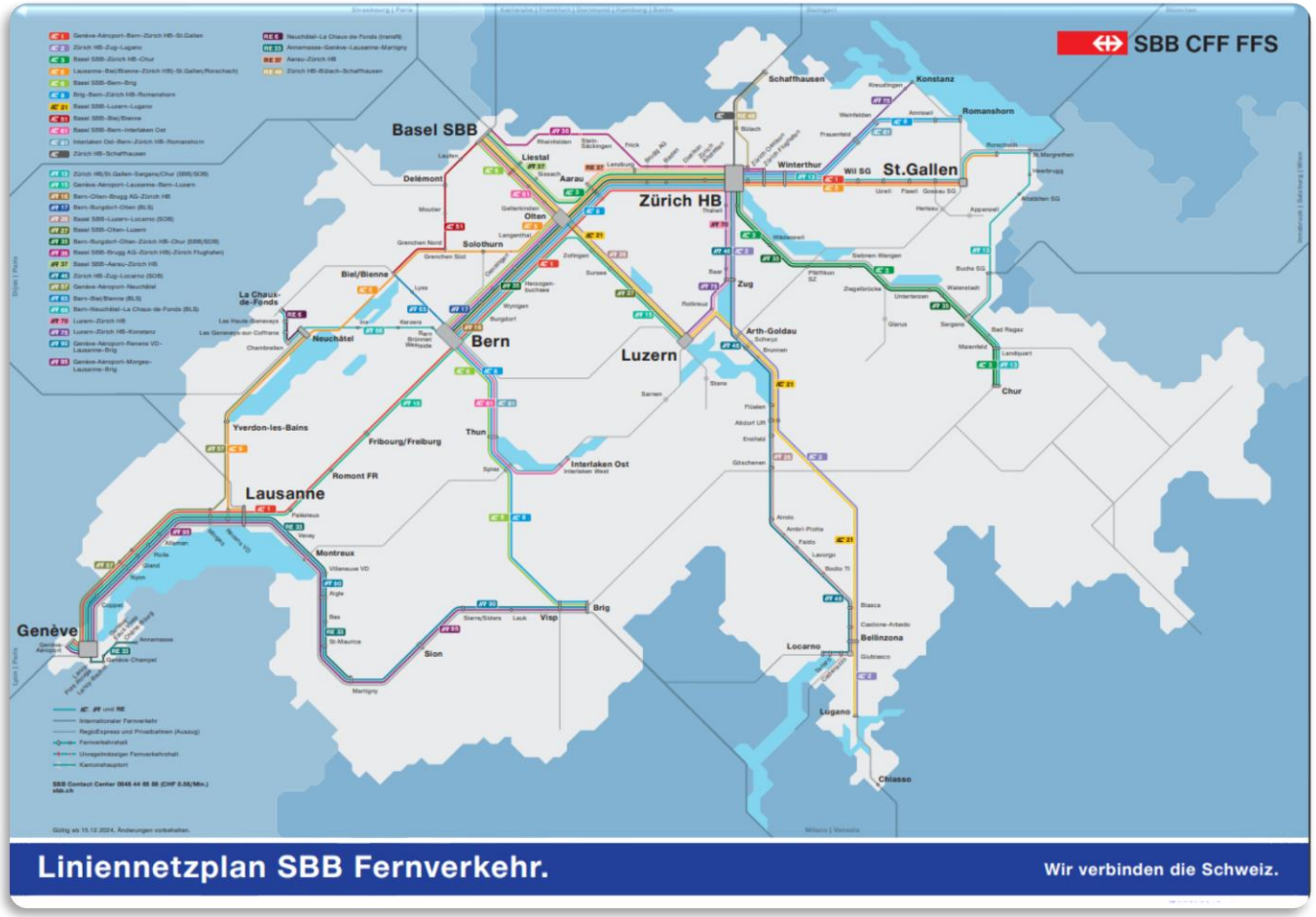
Netzgrafik-Editor - a human-centric timetable planning approach.



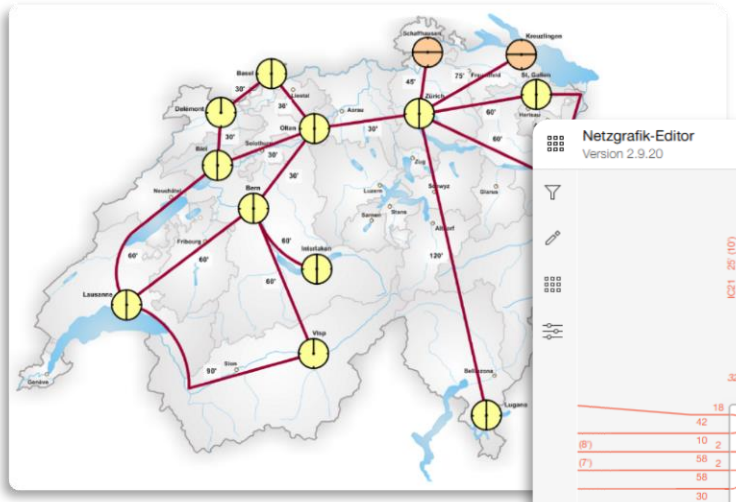
Adrian Egli - Swiss Federal Railways - FOSDEM - 2025 - Brussels

Motivation - There is a problem that needs to be solved.

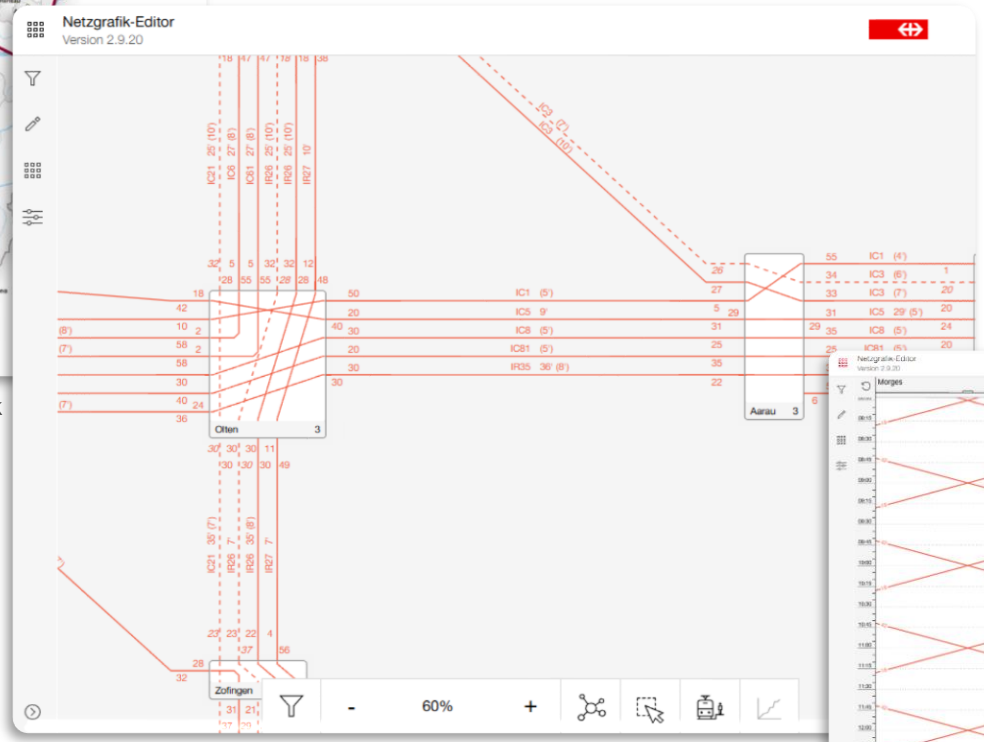


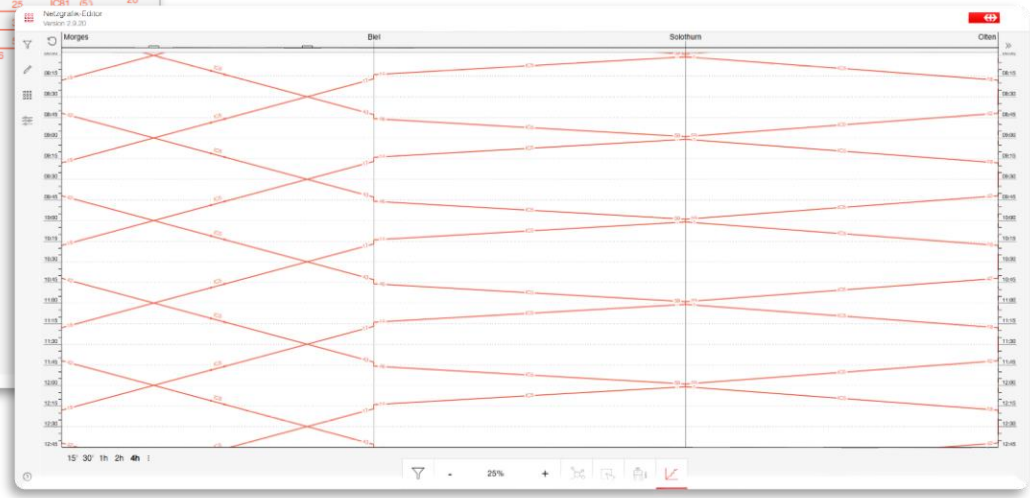
Public transportation must be very **well planned** to offer customers an **optimal service.**

Timetabling is a long, complex and data intensive task.



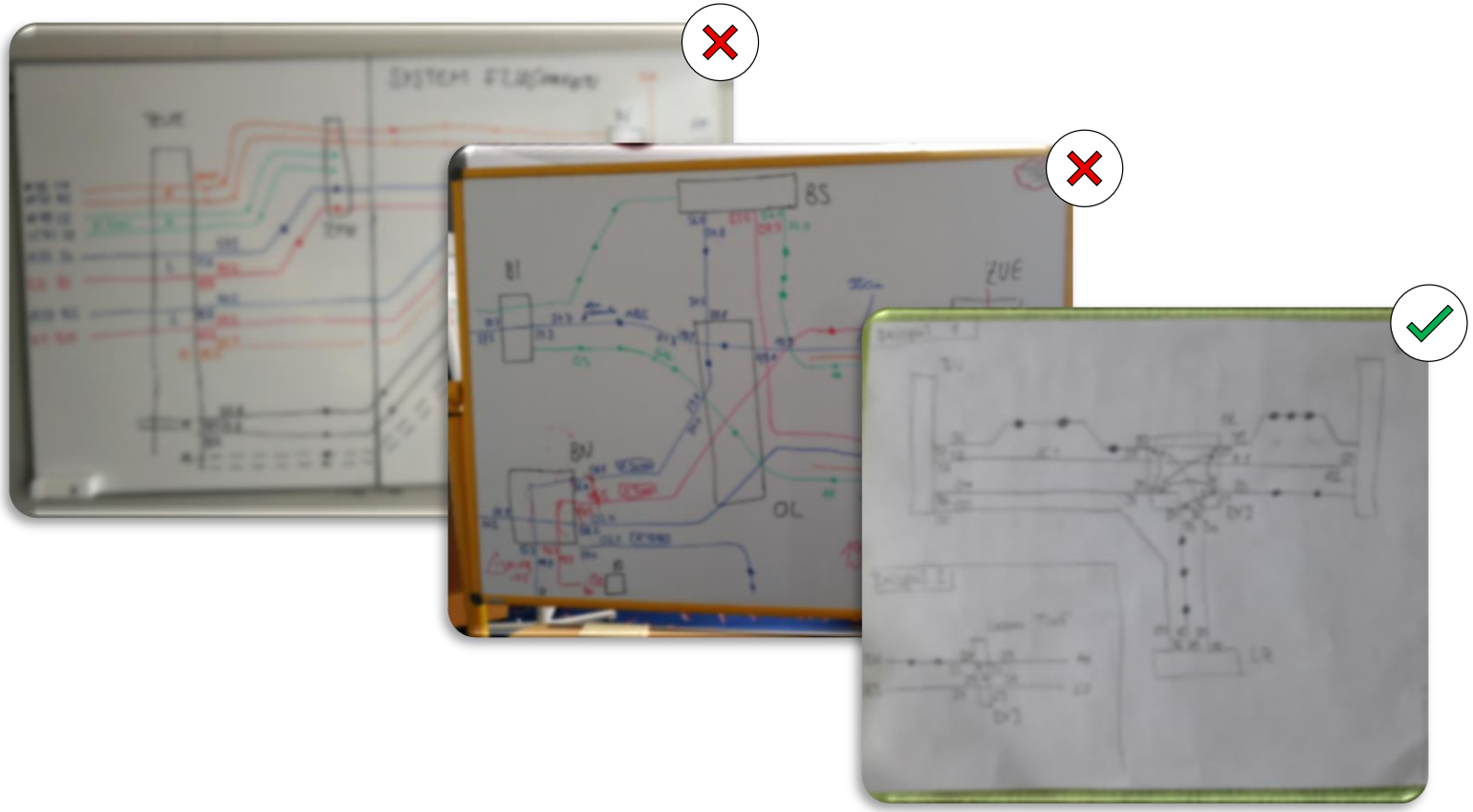
Source: https://de.wikipedia.org/wiki/Netzgrafik



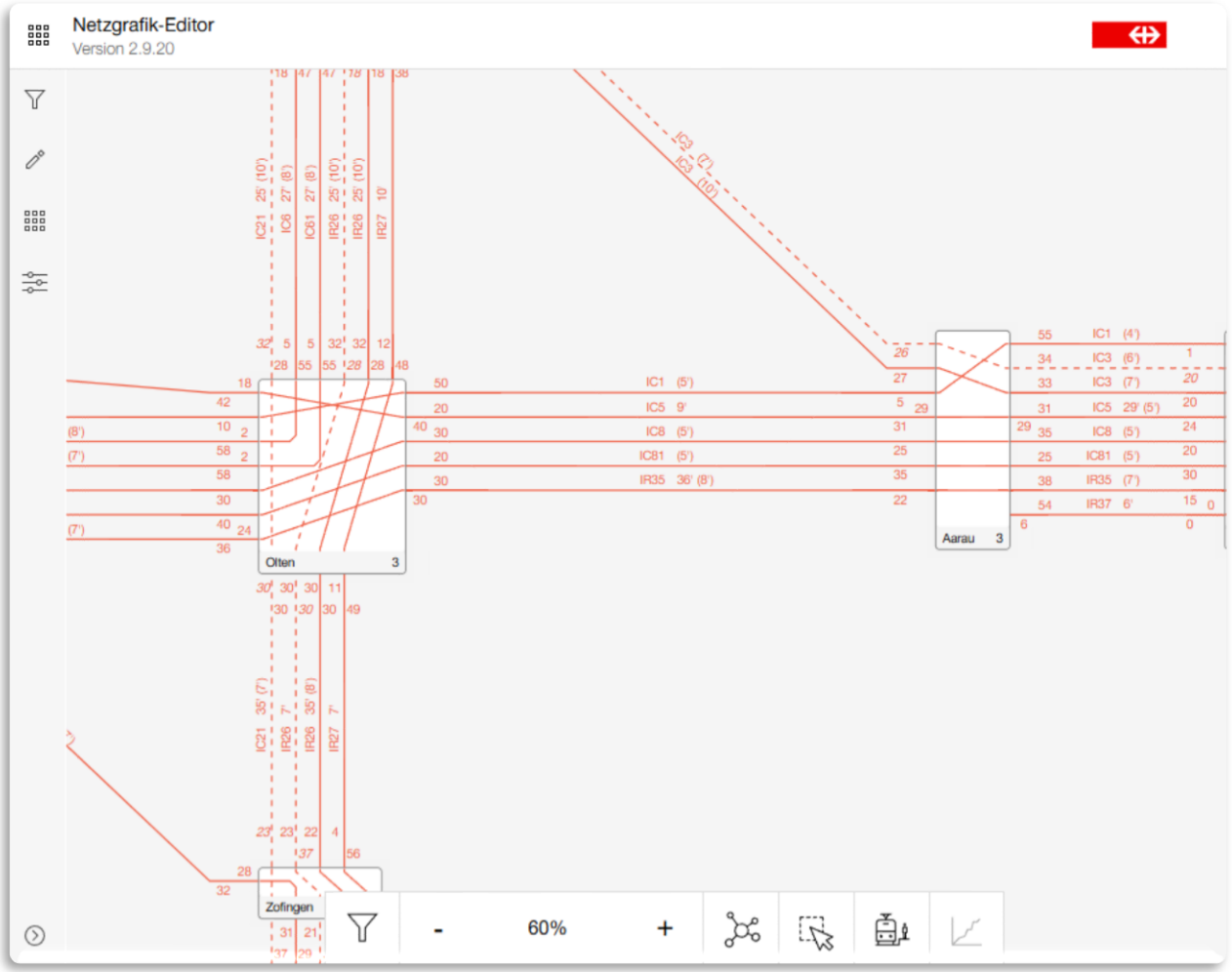


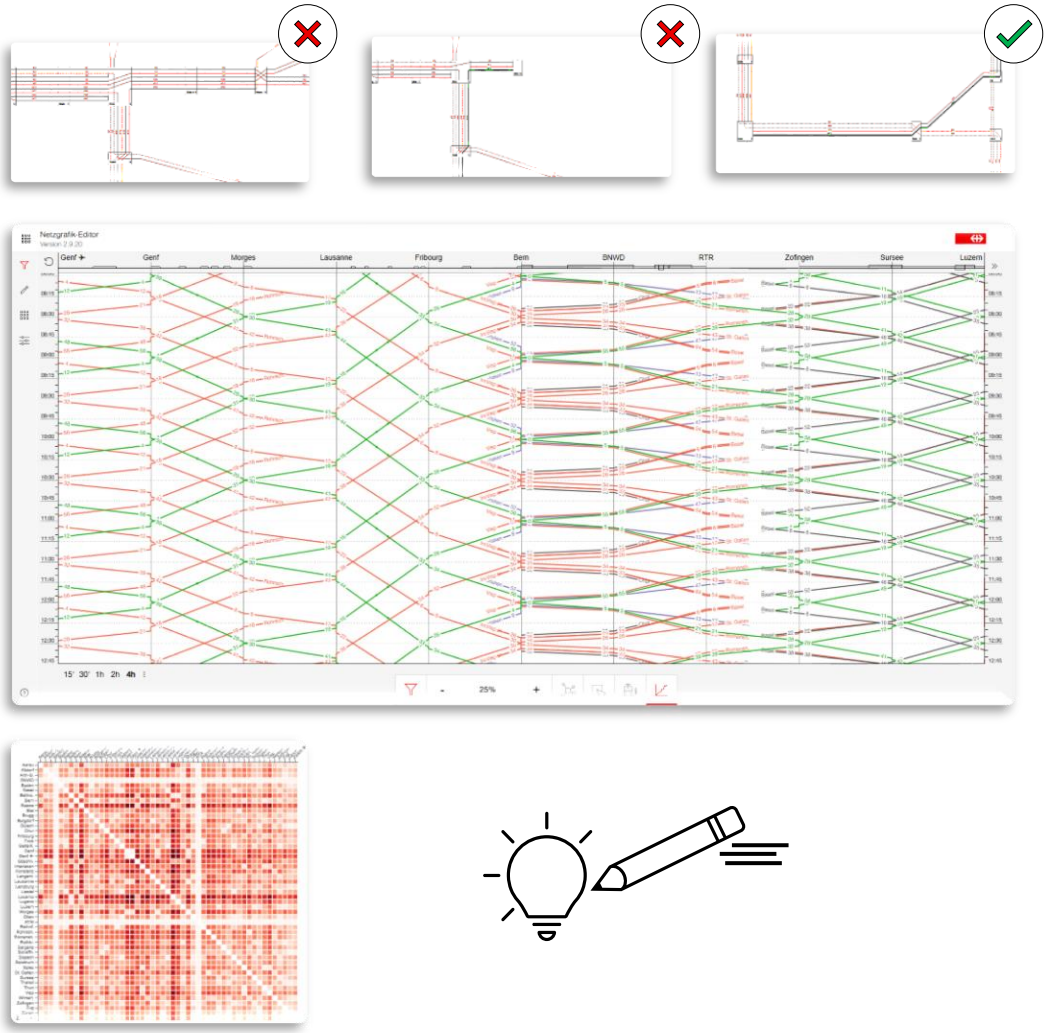
In Switzerland - The structure of the **traffic repeats itself each hour**, so the complete timetable can be represented very compactly as a “Netzgrafik”.
In Switzerland trains between cities (nodes) usually leave on the hour and half-hour – and the timetable is symmetric.

There is Not Just One Solution – Many Variants and Extensive Exchange.



Whiteboards are easy to use - but poor for data-driven analysis.





One of the first **user requirements** for the **Netzgrafik-Editor** was that it as software must be **as quick and easy to use as a whiteboard** or paper.
But the **analytics part** was never mentioned – also not **copy** and **paste** and many other functions which come for free with a digital solution.

Open Source - Why a Human-Centric Approach Matters.

Planning software where **creative work is key** – it should **not focus on automation**, but on how to **optimally support people** in their work.

Through User feedback - continuous improvements and self-promoting.

«I think it's a really cool tool. I'm already using it and would like to continue doing so.»

«It is a great and modern tool. People have clearly put a lot of thought into it.”

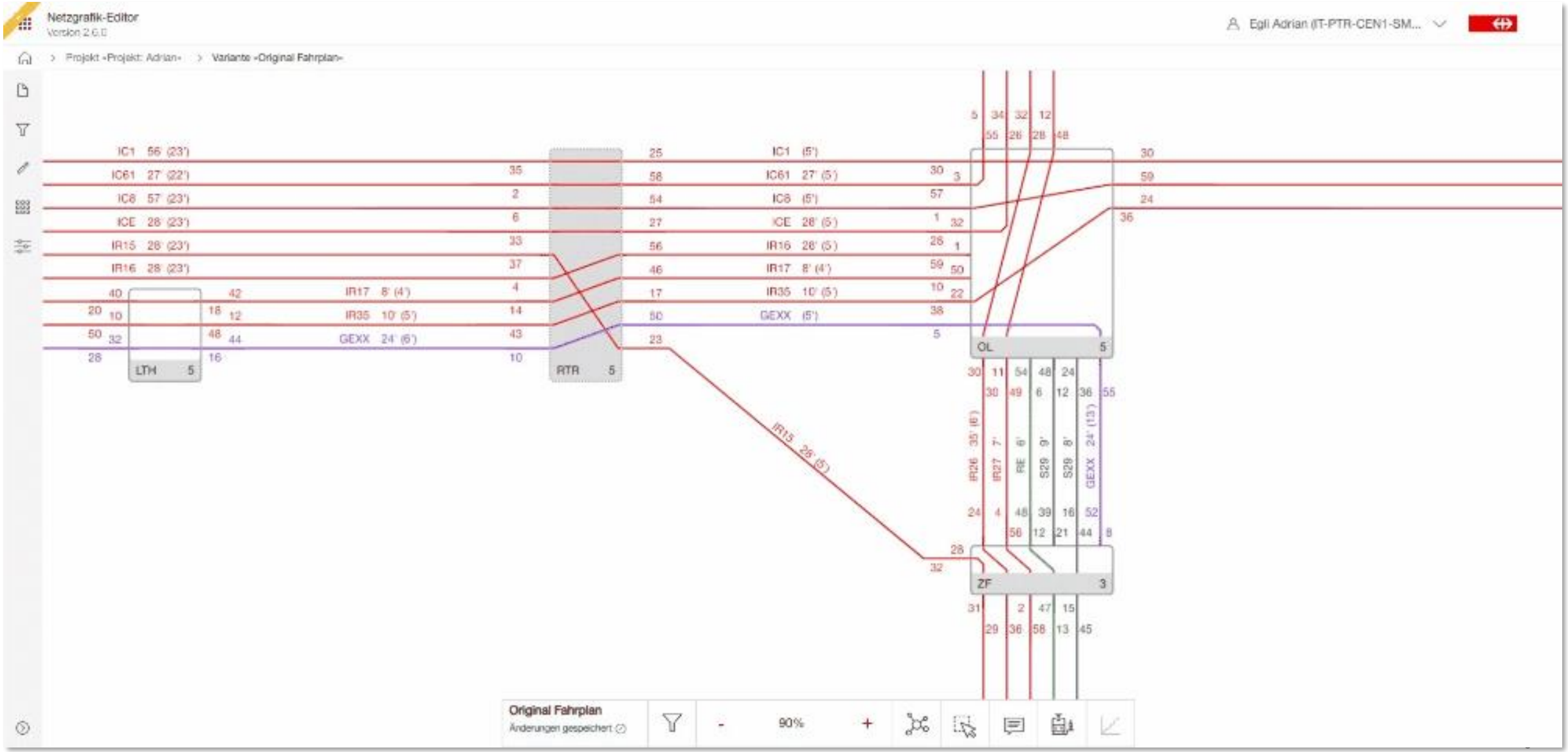
«I also immediately showed it to a colleague who was thrilled.»

«I always struggle a bit when I want to move the nodes. There must be an easier solution.»

«Ah, the delete button doesn't work. That would be my expectation.”

«One must be careful not to integrate too many features, as the tool might become overly complex and complicated. As a result, users may eventually have to spend a long time configuring settings before they can even start working.”

Netzgrafik-Editor – Live Demo.



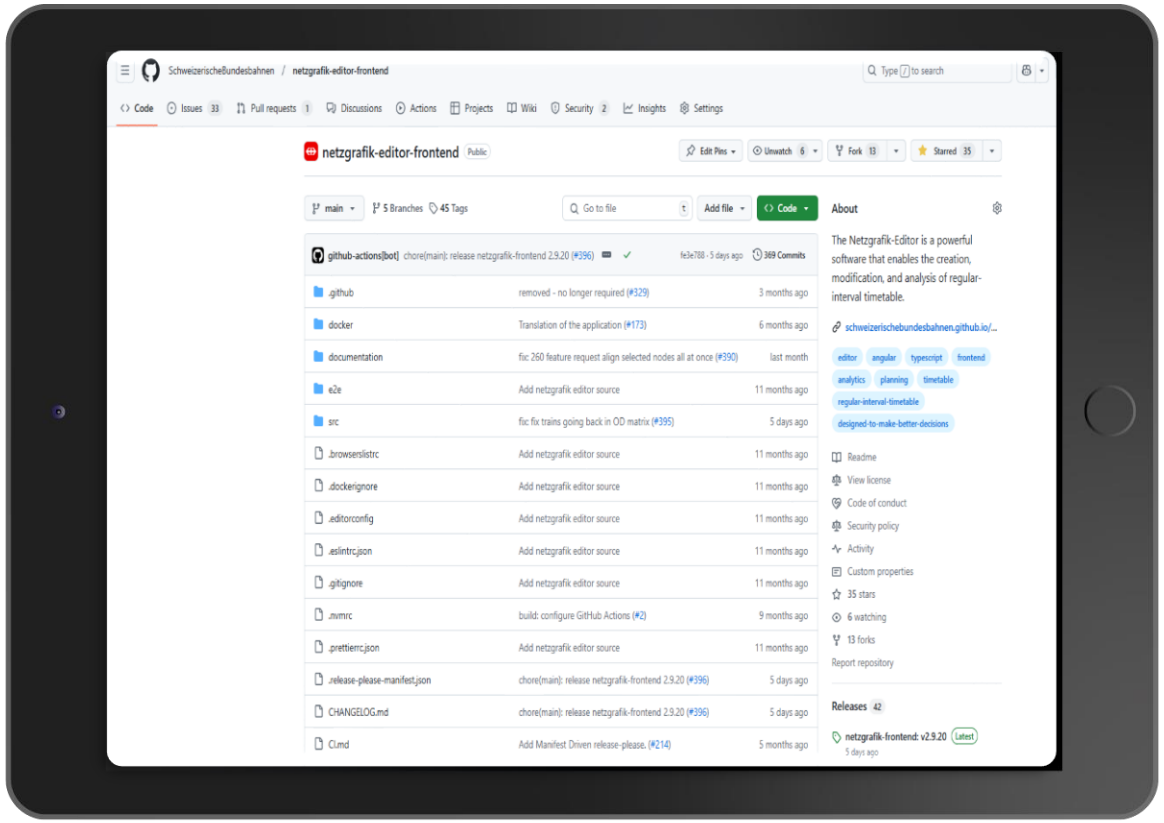
Open Source – Benefit from sharing with others.

The **Netzgrafik-Editor exemplifies a successful open-source project** within the public transportation sectors.

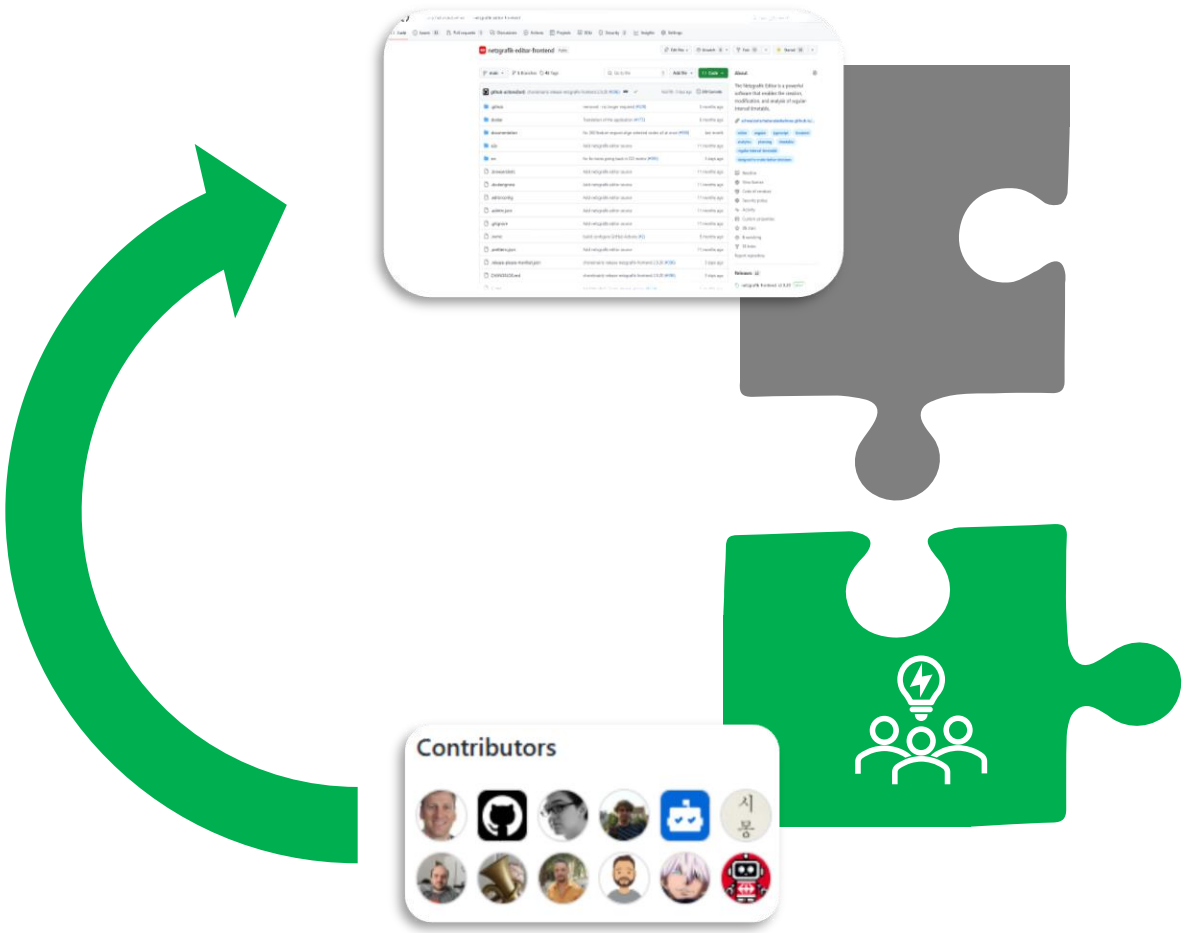
By embracing **open collaboration**, we leverage diverse expertise to address internal needs more effectively.

This approach creates a dynamic environment for **building, sharing, and profiting** collectively.

Open source shift our perspective from a **buy-versus-build** mindset to one where we collaboratively **build, share, and profit.**



The Power of Collaboration: Solving Problems Together.



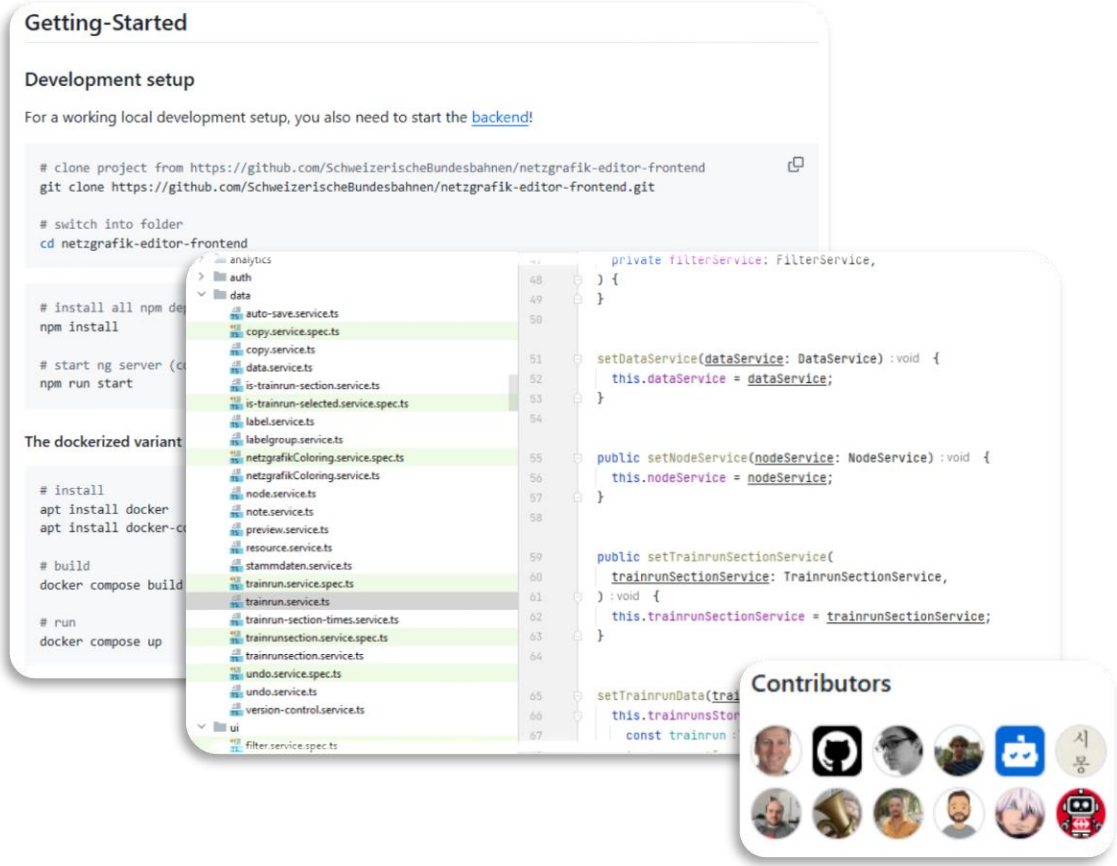
OPENRAIL ASSOCIATION

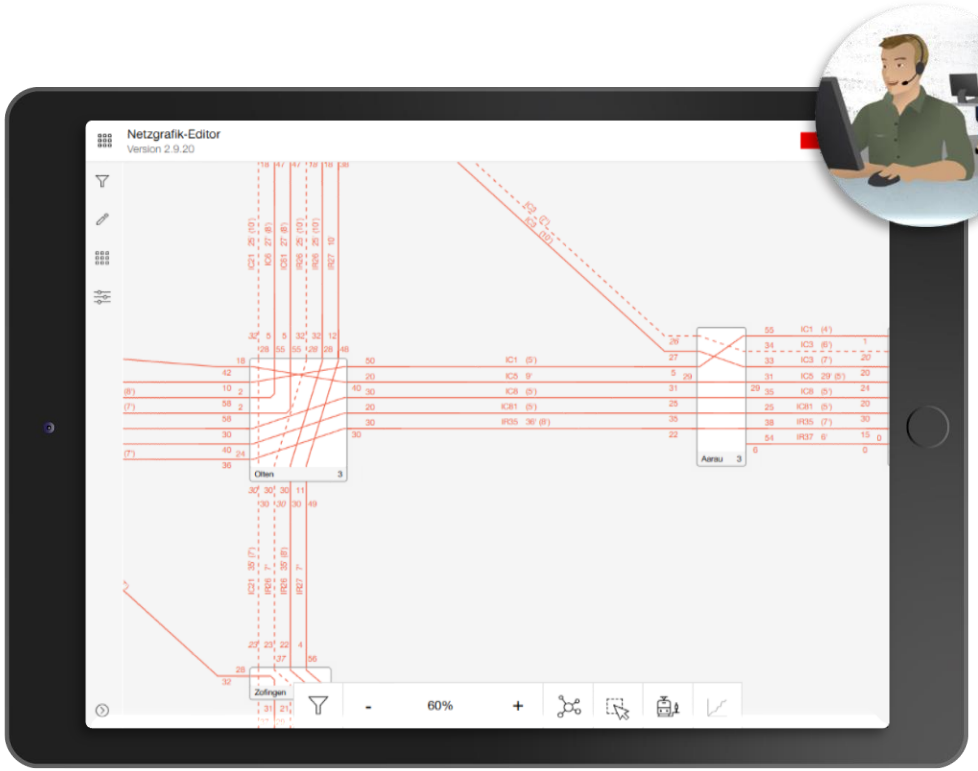
An Open Source initiative for Railways

SNCF

SBB CFF FFS

Open-Source is Not Enough - Attention Is All You Need.

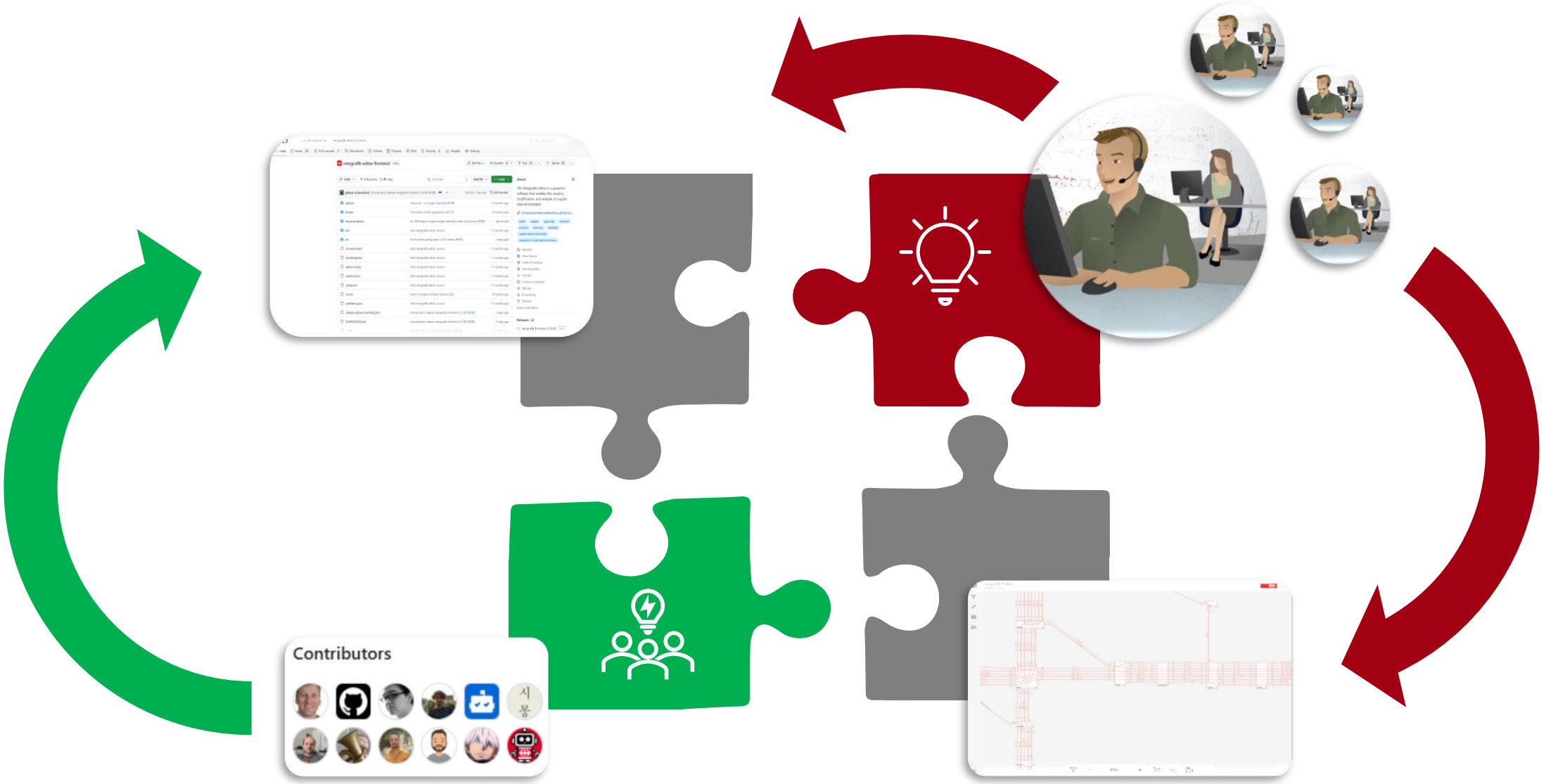




https://github.com/SchweizerischeBundesbahnen/netzgrafik-editor-frontend

Bridge the gap between **software developers** and **end-users.**

Full potential only realized in growing business-developer community.



Architecture - Technology Stack - Open Source is All You Need.

netzgrafik-editor-frontend

angular.app.sbb.ch

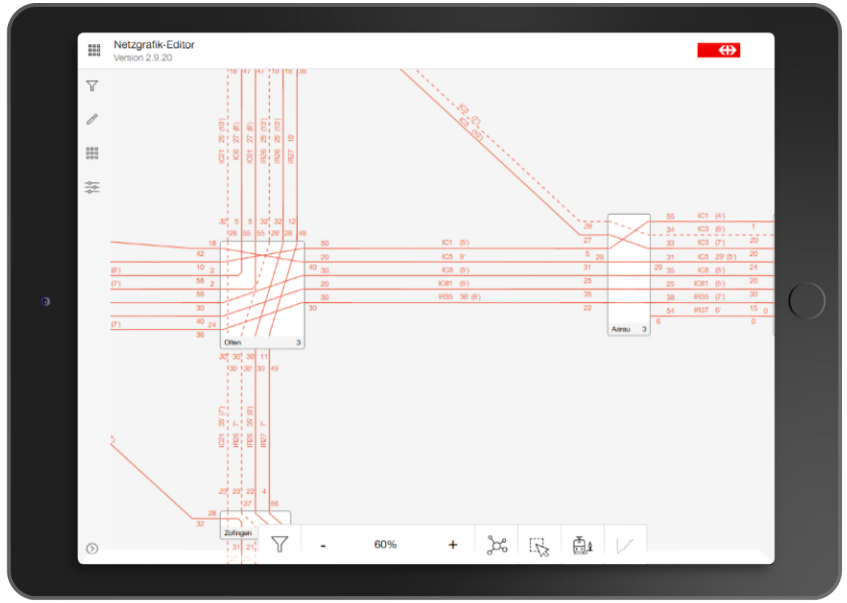
NgXEditor

3D.js

Angular

KARMA

TypeScript



SBB Digital applications – design

digital.sbb.ch

netzgrafik-editor-backend

Spring Framework

Spring Framework

Project Lombok

jOOQ

h2database

Redgate Flyway

Maven

PostgreSQL

KEYCLOAK

Open Issues – There is a Roadmap – but how to avoid forks?

Roadmap

Goals on the roadmap

This roadmap description outlines the strategic goals to improve the Netzgrafik-Editor's business value. It serves as a guiding document that aligns goals on the roadmap in the short and long term and outlines more general ideas.

Short-term goals on the roadmap:

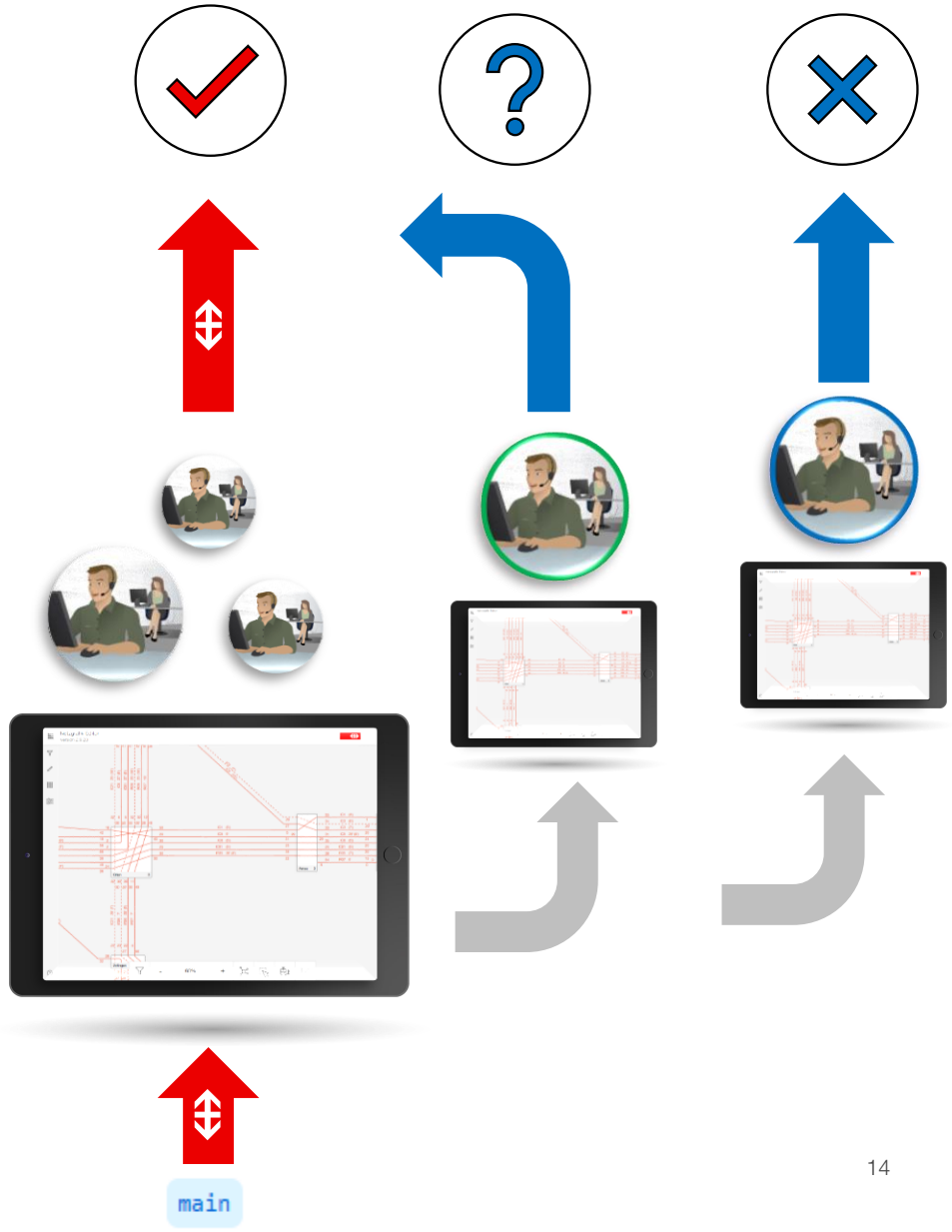
- Origin-Destination-Matrix: Travel time matrix for different routes / visualisation & analytics. (#126)
- Check conformity of business rules
- Comparision of variants
- Merge different variants: more Info.

Long-term goals on the roadmap:

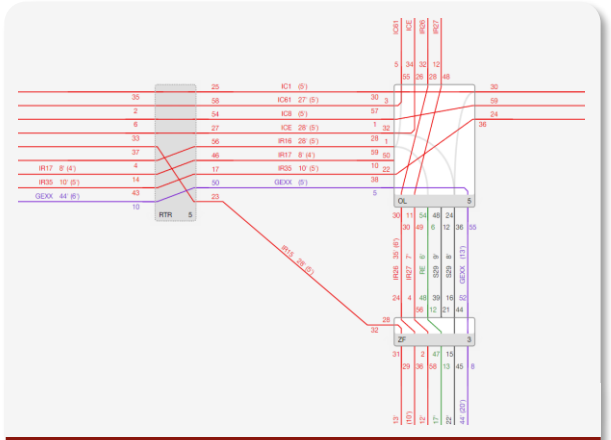
- **Integration in existing landscape of tools:** Integrate the developed tools with existing timetabling, demand simulation, and forecasting tools.
- **Compare existing demand forecast with designed supply:** Analyze and compare the forecasted demand with the planned supply.
- **Automatically derive timetables from demand:** Develop algorithms to automatically generate timetables based on the predicted demand.
- **Circulation and requirements for rolling stock:** Evaluate the circulation and rolling stock requirements based on the planned timetables.
- **Actual/target comparison of mesoscopic infrastructure:** Compare the actual/existing infrastructure with the target infrastructure

Ideas for the roadmap:

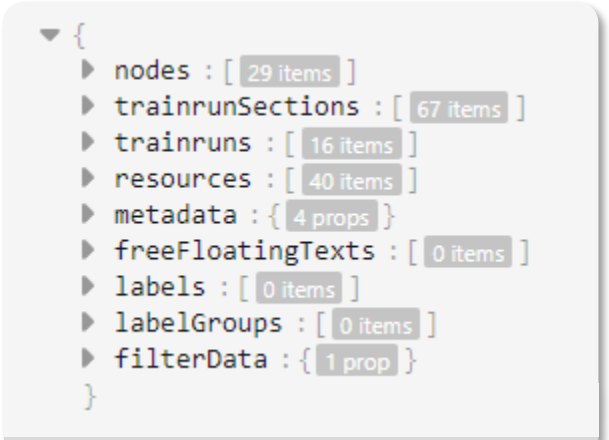
Efficiently design and compare different variants of multimodal timetables/concepts. Gain insights by extracting the entered information through smart projection and analytics capabilities. These goals and ideas indicate a focus on improving travel time analysis, ensuring compliance with business rules, and integrating various tools for better planning and decision-making. Additionally, the ideas emphasize the importance of efficient design, data analysis, and gaining insights from the collected information.



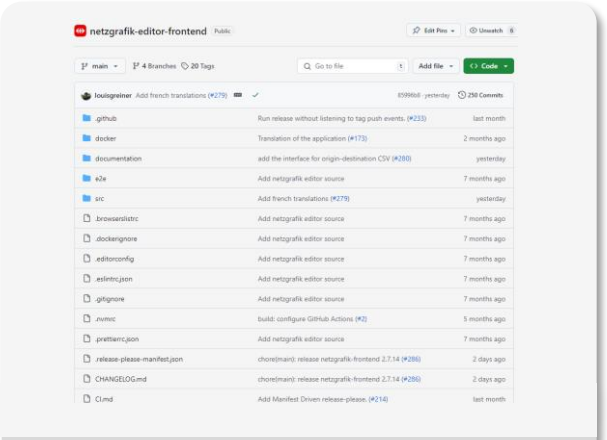
Let’s help - Easy to use – easy to contribute – easy to start.



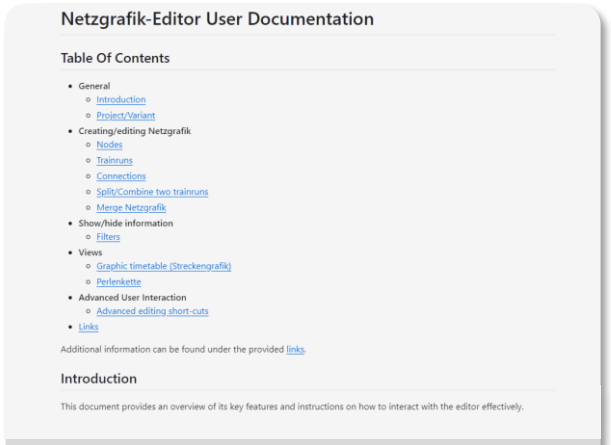
Online: Netzgrafik-Editor



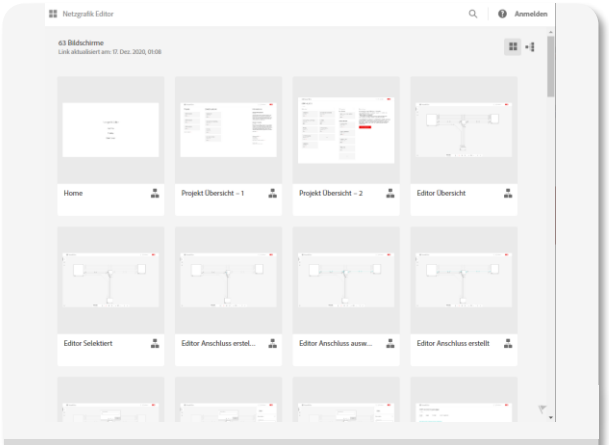
Share data (JSON)



GITHUB (Source Code)



User Manual



UX Design