Annual Report 2024 of the OpenRail Association

Text in italics (such like this) is meant as instructions how to fill the sections. It should be removed before finalising the report.

OpenRail Logo

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Executive Summary

Message of the Chair of the Board

The OpenRail Association Board

Pictures of all board members with name, role in the board, organization and title in their organization

For each board members we would like to have a brief quote about the OpenRail Association. Ideally this alltogether tells a story.

For each board member there is an own file where we collect the respective info and text (`05xx.md`)

We leave the chairs of the TC out here as they have their own page later.

Jochen Decker

Frédéric Novello

Jean-Michel Evanghelou

Nicole Göbel

Brede Dammen

Erik Nygren

Fatima Zohra El Ouerkhaoui

Peter Franken

Open Source for the Railway Sector

Tell the story of what the organization is built for. What does it want to achieve and how do the steps we did in 2024 are the beginning of this effort.

OpenRail Projects

One-page overview of the projects with brief summary and ideally some icon to visually represent each project.

For each project we will add the incubation stage as a small visiual indicator using the badge.

In the following subsections we have a deep dive for each project (`07xx.md`).

Each project should address the following topics:

- *Which domain, which business requirement does it address*
- *Which functionality*
- *Technology*
- *Adoption, community*
- *Potential, future perspective*
- *Reached milestones*

In 2024 the OpenRail Association accepted the first five open source projects in its incubation process. Dive deeper on each of the projects on the following pages.

Open Source Railway Designer (OSRD)

OSRD is an open source web application for railway infrastructure design, capacity analysis, timetabling and simulation and short term path request.

Rail Condition Monitoring (RCM OSS)

RCM by SBB comprises a suite of products for rail condition monitoring. Based on the open-source data format RCM-DX (RCM Data eXchange), RCM enables easy accessibility and visualization of railway diagnostic data.

Digital Automated Coupling Migration Decision Support System (DAC Migration DSS)

Within the next years around 500 K freight wagons all over Europe owned and operated by various corporations will be converted from screw couplers to digital automatic couplers (DAC). To facilitate the migration process, a decision support system (DSS) is planned under the project.

Netzgrafik-Editor (NGE)

Netzgrafik-Editor is now a mature tool for creating and analyzing regular-interval timetables. It's versatile for logistics planning in various domains. Features include interactive editing, graphic timetables, trainrun editing, and logistics analysis.

Library for Linear Reference Systems (libLRS)

The goal of the library is to have a flexible, high performance and easy to integrate linear referencing systems (LRS) library that can be used in any system to manipulate LRSs.

Open Source Railway Designer

Rail Condition Monitoring

RCM by SBB comprises a suite of products for Rail Condition Monitoring. Based on the data format RCM-DX (RCM Data eXchange), RCM enables easy accessibility and visualisation of railway diagnostic data. The aim of RCM OSS (open-source software) is to make rail condition data easy to access, store and visualise. Therefore, RCM OSS is beneficial to railway companies as well as suppliers of measurement system.

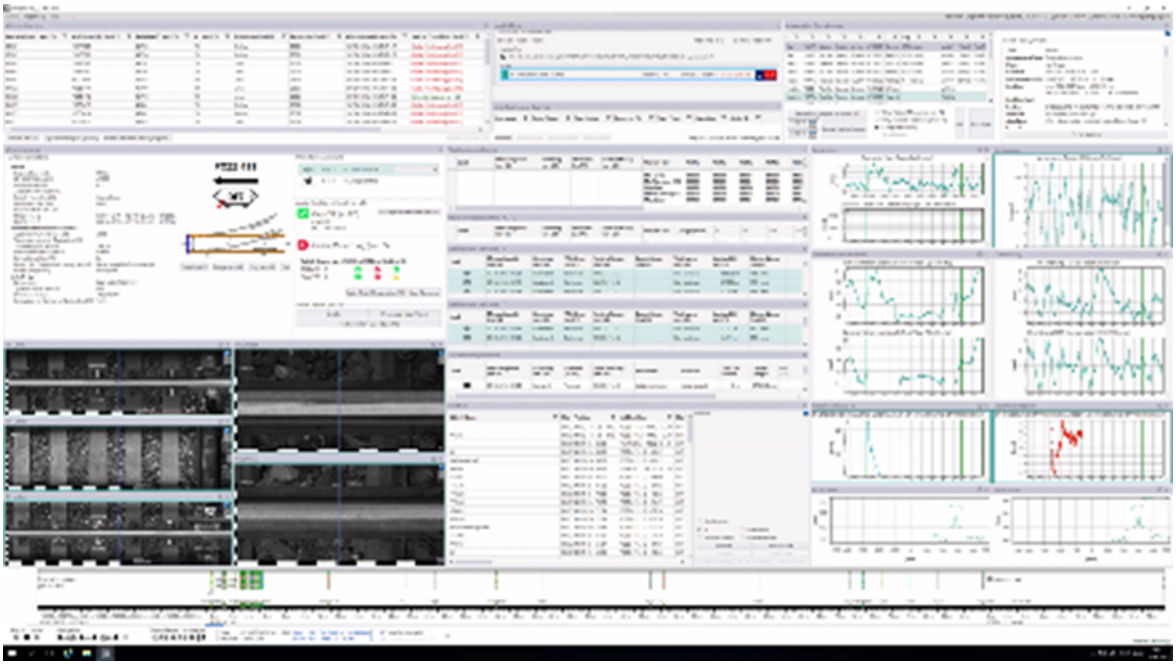
The RCM-DX file format is available open-source. With RCM-DX we step away from proprietary data formats which require specialised software and know-how, towards a self-contained and open format. RCM-DX can be accessed through standard HDF5 tools. We recently added an open-source MATLAB function to facilitate more specific reading of RCM-DX files. The accompanying visualisation software, RCM-DX Viewer, is available as freeware.

RCM-DX is used by SBB to store, manage and exchange diagnostic data. SBB exchanges with and delivers diagnostic data to other Swiss railway companies and universities. Infrabel and SNCF réseau are in the process of establishing RCM-DX for storing diagnostic data in future.
In the ERC project Europe's rail, RCM-DX is being evaluated as a candidate for a European data format to store and exchange railway diagnostic data. Its properties bear great potential for every railway company to be independent of proprietary software and therefore in full control of their data as well as to facilitate data exchange across companies and countries. The full potential of RCM OSS will be released with the publication of an open-source Read/W rite library and the open-source RCM-DX Viewer in future.

RCM OSS has been accepted as a project at the Open Rail Association in 2024. RCM-DX, accompanied by a facilitating MATLAB function are available as open-source. The RCM-DX Viewer including sample data are available as freeware. The publication of an RCM-DX R/W library is aimed for in 2027.

Links and references: https://bahninfrastruktur.sbb.ch/en/products-and-services/bahninformatiksysteme/anlagenmanagement/rail-condition-monitoring.html https://github.com/OpenRailAssociation/rcm-dx https://github.com/OpenRailAssociation/rcm-dx-examples https://archive.fosdem.org/2023/schedule/event/rot_rcmdx/

RCM DX Logo



RCMDX_Viewer

Digital Automated Coupling Migration Decision Support System

Netzgrafik-Editor

Netzgrafik-Editor (NGE) is a mature tool used in long-term planning for creating and analyzing regular-interval timetables at a macroscopic level of detail. It's versatile for timetable planning in various modes of transport. Features include interactive editing, graphic timetables, train run editing, and analysis.

NGE is used daily by Swiss Federal Railways (SBB) planners for developing macroscopic long-term timetable concepts. It enables quick creation of new ideas as variants, their analysis, and decision-making on their feasibility. NGE offers the user functionality to enhance the efficiency and optimization of traffic in a network.

As a user-friendly and interactive graphical editor, the software allows for the creation and editing of regular-interval timetables through a visual interface. This interface makes it easy to visualize and adjust the network. Lines (train runs) in the Netzgrafik can be transferred into a graphical timetable (time–distance diagram) representation. Planners can manually draw and edit the train runs as if arranging pearls on a string. This feature enables them to define crucial aspects of the traffic network and tailor it to specific requirements and constraints. The software allows planners to extract important information, such as departure and destination stations, departure and arrival times, and train frequency.

Based on the network and the timetables, the software provides insights into connection and transfer times. This facilitates optimization and efficiency improvement in a transport system. Additionally, infrastructure requirements can be estimated, aiding in infrastructure planning and decision-making.

NGE is a web-based tool with a frontend developed using SBB open source Angular components, providing an interactive graphical interface accessible through a web browser. Much of the logic is implemented in TypeScript on the frontend to ensure performance and interactivity with low latency and maximum responsiveness. The backend, implemented with the Spring Framework and Spring Boot mainly persists the data.

NGE, initially developed internally at SBB, became open source in 2024. Similarly, the SNCF's Open Source Railway Designer (OSRD) focuses on microscopic medium and short-term timetabling, capacity analysis, and simulation. In 2024, a productive collaboration began between the two development teams. This collaboration led to contributions from the OSRD team to the NGE project. In return, the OSRD team integrated NGE components into their software. Such a fruitful collaboration would have been unlikely without the OpenRail Association. In an independent project, an open source converter was developed to export data from NGE into timetables for the entire service day in different formats, such as GTFS static or MATSim transit schedules.

To build a broad community and develop its full potential, the Netzgrafik-Editor needs additional users within transport companies, public administrations, and educational institutions. For timetable planners or students in transport planning, opening the source code is insufficient. To bridge the gap between software developers and end-users, the application was made freely accessible online in 2024 to ensure that it reaches a broader audience. Open-source success relies not just on code availability but also on user engagement and accessibility.

In 2025, the focus is strengthening the community to attract more users and active developers on developing functionalities. The roadmap outlines the strategic goals to improve the Netzgrafik-Editor's business value.

Further information: - Netzgrafik-Editor Frontend on GitHub - Netzgrafik-Editor Backend on GitHub - Netzgrafik-Editor Converter on GitHub - Online Demo Instance operated in the cloud of the Flatland Association - Open SBB Design System on GitHub - Netzgrafik-Editor at FOSDEM 2025 - Open Source Railway Designer (OSRD - MATSim for large-scale agent-based transport simulations

Library for Linear Reference Systems

Message of the Chairs of the Technical Committee

Message from the Technical Committee, highlighting beginning collaboration (example OSRD/NGE).

Members

One-page overview of members. Grouped by membership category.

Building the organization

2024 has been the year of building up the organization. Tell the story, significant milestones, use it to mention the important organizational parts, link to where to find more information, such as governance documents.

Participating in Events

Events OpenRail participated in, along with photos where we have them. Tell the story of building a community.

- FOSDEM
- InnoTrans
- Flatland Symposium

Join us

Text from our one-pager. To be adapted.

OpenRail Association – Open Source for the Railway Sector

We create an open, autonomous and collaborative space to work together on rail-specific software initiatives.

Our goal is to: - Unlock the benefits of open source for the sector - Accelerate innovation - Increase efficiency - Improve interoperability

Contribute to our projects to collaboratively create solutions for the challenges of digital transformation within the railway sector: https://github.com/OpenRailAssociation

Topics – Active Open Source Projects:

- Maintenance *e.g.* *RCM-DX*
- Timetable Planning *e.g.* *OSRD*
- Netdesign *e.g.* *Netzgrafik Editor*

Established in 2024 by: - DB - SBB - SNCF - UIC

Join us as a member to support an open-source ecosystem for the railway sector: https://openrailassociation.org/about

Endnotes

Website

Find more information on the OpenRail Association at https://openrailassociation.org.

Contact

To contact the OpenRail Association send us an email at contact@openrailassociation.org.

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