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Overcoming age-old barriers to industry innovation

The OpenRail Association makes the case for broader adoption of open-source software collaboration within the rail industry.

THE development and deployment of new software solutions is driving almost every improvement in rail sector service provision, from updates to signalling and traffic management systems to onboard service.

But while digitalisation is now a must for railways, the sector is arguably not making the most of the opportunity. The prevalence of proprietary, nationally-siloed systems means that each railway is continuing to speak its own digital language, preventing the wider industry from working together to overcome the challenges posed by high integration costs, fragmented data exchange, and other barriers to the successful and efficient adoption of new technology.

Success in this new world requires a new way of thinking and working that will accelerate modernisation and better control costs. As a result, the industry is exploring open-source information technology as a means of pushing the wider sector to converge towards the development and adoption of a new shared digital model that is no longer held back by the constraints of interoperability.

At its core, open source aims to provide engineers, researchers, and developers with access to a horizontal workspace where they can solve broader industry challenges by co-creating on shared platforms. Unlike open data, open source shares only the software layer. Data remains private, secure, and controlled by each organisation, making it possible to share or update any tool that is developed with anyone else around the world without fear of losing a competitive advantage or breaching privacy regulations. By allowing multiple teams to effectively work on the same project, it is hoped that the wider industry will benefit from more dynamic solutions that integrate more easily with other physical networks, including other railways as well as energy, and public information networks.

Recognising the potential of open source, and the need to introduce a space where railway companies can jointly build the digital foundations of a more open, interoperable, and robust sector, French National Railways (SNCF), German Rail (DB), Swiss Federal Railways (SBB) and the International Union of Railways (UIC) came together in January 2024 to establish the OpenRail Association.

OpenRail was founded on the principle of fostering cooperation over competition with the goal of creating a common platform for standards, interoperability and efficiency in the rail sector and to drive improved competitiveness. It is intended as a neutral space for railway companies to jointly develop, host and evolve open-source software. The international association is based in Brussels and has since been joined by Belgian infrastructure manager Infrabel, Moroccan National Railways (ONCF), Norwegian state-owned ticketing provider Entur, and open-source specialists, Flatland and Eona-X.

OpenRail currently hosts five flagship projects - Open Source Railway Designer (OSRD), Net Graphic Editor (NGE), RCM OSS, DAC Migration DSS and libLRS. Each demonstrates industry collaboration in areas such as capacity simulation, timetable design, condition monitoring, deployment of the Digital Automatic Coupler (DAC) and migration planning.

"Traditional approaches to cooperation have often been slow and fragmented," says Jochen Decker, CIO at SBB and chair of the OpenRail Association. "Open source offers a different path: agile, community-driven and already proven in other industries. Just as Linux and Android transformed IT by breaking monopolies and fostering innovation, it can be the same for rail. Our projects have gained strong traction on [proprietor developer platform] GitHub, reflecting growing demand and engagement from the open-source community."

Alongside its projects, the association has formed a technical committee and a project scouting working group, which work in close cooperation with members and project teams to identify opportunities and advance projects.

Decker says that the association regularly participates in the open-source sector's main events, including the annual Free and Open Source Software Developers' European Meeting (Fosdem), which gathers together more than 8000 developers at the Free University of Brussels for a two-day collaboration across hundreds of projects and a wide range of technical applications. Members of the OpenRail community are also organising the Railways and Open Transport Devroom, a meeting point for more than 200 developers involved in smarter and greener transport.

OpenRail's inaugural conference took place in December 2025 at the SNCF Business Centre in Paris. Nearly 400 people - developers, business leaders, politicians and European Commission (EC) representatives - took part in the event, which featured project demonstrations, and presentations on major issues of advancing open source in the railway community. OpenRail is set to continue these discussions at InnoTrans in Berlin this September.

Advocate

UIC is a passionate advocate for open source. The association believes that widespread adoption will prevent the rail sector from missing the broader technological revolution now underway. Speaking at the OpenRail conference, UIC director general, François Davenne, said that open source can help the wider industry to realise that "we are all operating the same network" and to reap the benefits of integration already seen in aviation and road.

"We want to convince the rail community that it is important for us to work together on key developments and share open-source solutions," Davenne says.

OpenRail members are in agreement. Daniel Woïthe, CTO at DB Systel and vice-chair of OpenRail, believes that "applying these principles and practices to rail-specific solutions is an opportunity to help shape the digital future of the railway sector."

Likewise, OpenRail board member and chief information and digital officer at ONCF, Fatima-Zohra El Ouerkhaoui, says she hopes the wider acceptance of open source will result in less dependence on proprietary solutions throughout the sector, increasing the pool of vendors available to support rail projects and helping to drive down costs. "In three years, I would like to see open-source solutions fully deployed and operational, along with a stronger and broader community, especially within the academic world," she says.

OpenRail appears to be the ideal place for this journey to happen. **IRJ**