Putting the Railway Industry on the Open Source Track

Cornelius Schumacher <cornelius.schumacher@deutschebahn.com>

FOSS Backstage 2025

Challenges of the railway sector

Railways face shared challenges:
- Technical & operational standards
- Regulations
- Cross-border operations
- Interoperability
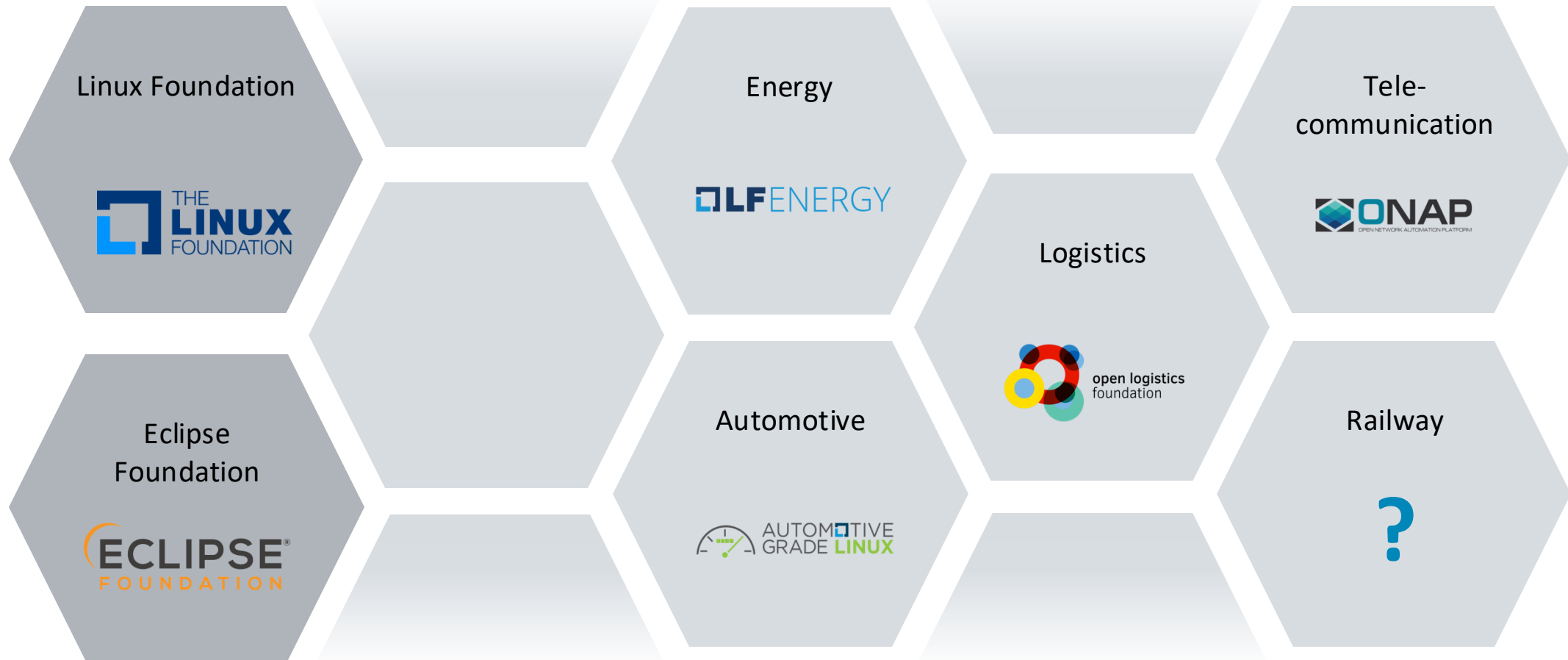- Safety requirements

Shared challenges call for shared solutions:
- Increase efficiency by avoiding redundant development
- Accelerate innovation through open collaboration
- Improve the railway sector as a whole

Shared solutions are best built through Open Source

Open Source in other industries

Linux Foundation

Energy

Tele-communication

Eclipse Foundation

Automotive

Logistics

Railway

Growing commitment to open source

We founded the OpenRail Association to fill the gap

Wait, a new foundation?

#FOSSBack 18: Cornelius Schumacher – The spectrum of FOSS governance models

Be conscious about governance, not formal
Spell out fundamentals such as license
Learn from others
Don't create foundations
Beware of growth
Keep your sanity
Be kind

Why OpenRail Association?

- **Railways are not software businesses**

- Open Source is a **cultural shift**

- We need to **reach people** where they are
- We need to speak a language **people understand**
- We need to **connect** with existing organizations

- We build a **new community**

- As large organizations railways usually have the capabilities to deal with the administrational aspects

Facts & Figures OpenRail Association

- Founded on **Januar 7th 2024** as international non-profit **AISBL** under Belgian law
- Founding members: **SBB, DB, SNCF, UIC**
- Additional members joined in 2024: **Entur. Infrabel, Flatland Association, ONCF**
- Onboarded **5 open source projects** in its first year
- **80 active committers**

- **Website:** https://openrailassociation.org
- **GitHub:** https://github.com/OpenRailAssociation
- **Contact:** contact@openrailassociation.org

Organizational Structure

Members

Technical Committee

Open Source Projects

Board of Directors

Governance

Bridge organization and technology

Open Source Collaboration
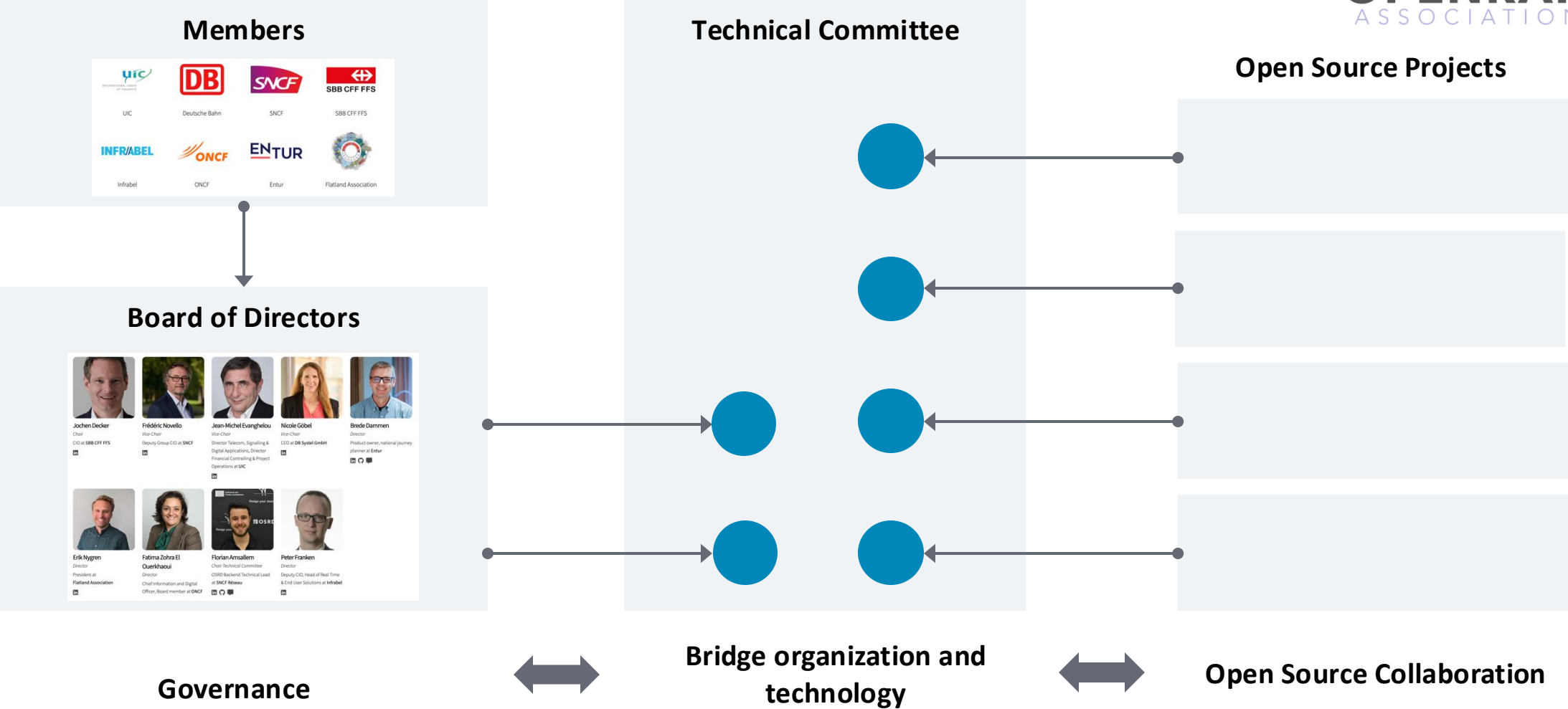
OpenRail Projects

OSRD

Capacity management, network simulation
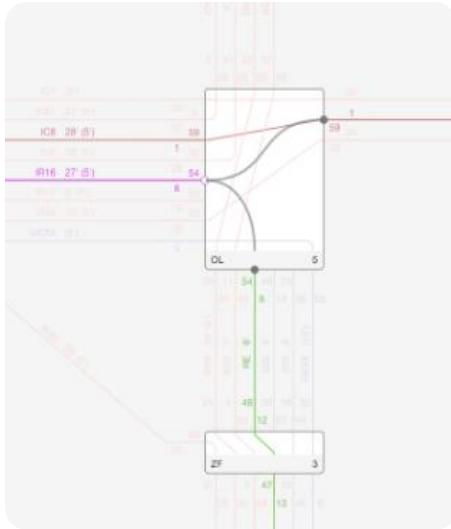
Netzgrafik-Editor

Timetable planning

DAC Migration DSS

Digital Automatic Coupling

RCM OSS

Rail Condition Monitoring
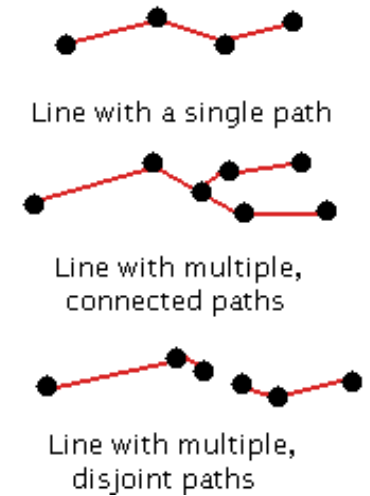
libLRS

Linear Reference Systems

Open Source Railways Designer (OSRD) – Digital Twin of Railway Operations

https://osrd.fr/en/

Web application for railway infrastructure design, capacity analysis, timetabling, and more

- Running time simulation
- Infrastructure editor
- Map rendering
- Rail pathfinding / short term path request
- Interlocking and signaling

Challenges & Solutions, Lessons Learned

Incubation Process

Candidates
(Evaluation)

Stage 1
(Formation)

Stage 2
(Quality)

Stage 3
(Adoption)

Official OpenRail Projects

Criteria of incubation stages

Stage 1: Formation

- Project addresses a **railway-specific challenge**.
- Clear commitment to **open source principles**.
- Pledge to follow **open governance** practices.
- Alignment with **OpenRail Association values**.

Stage 2: Quality

- **Active contributor base** ensuring sustainable development.
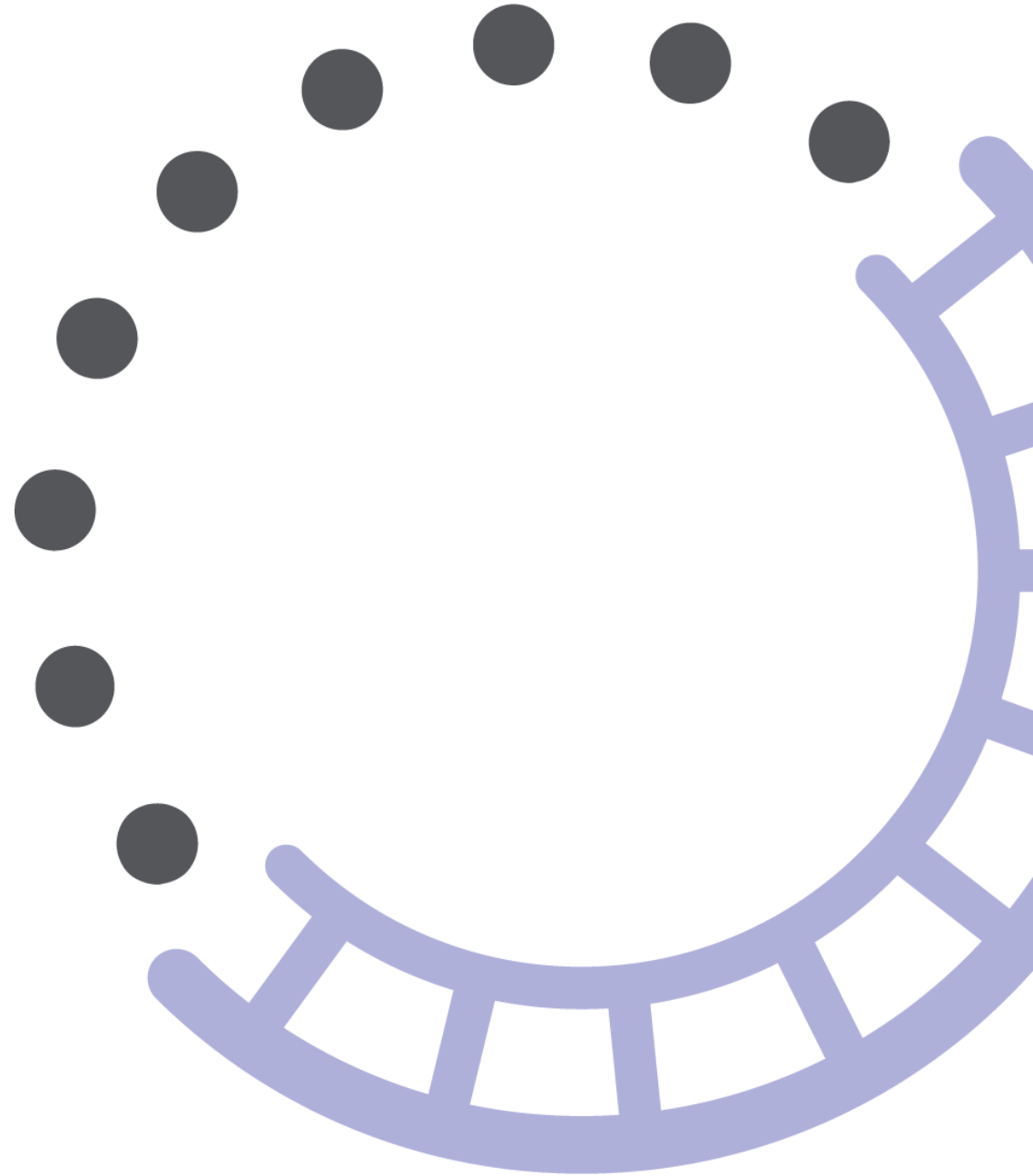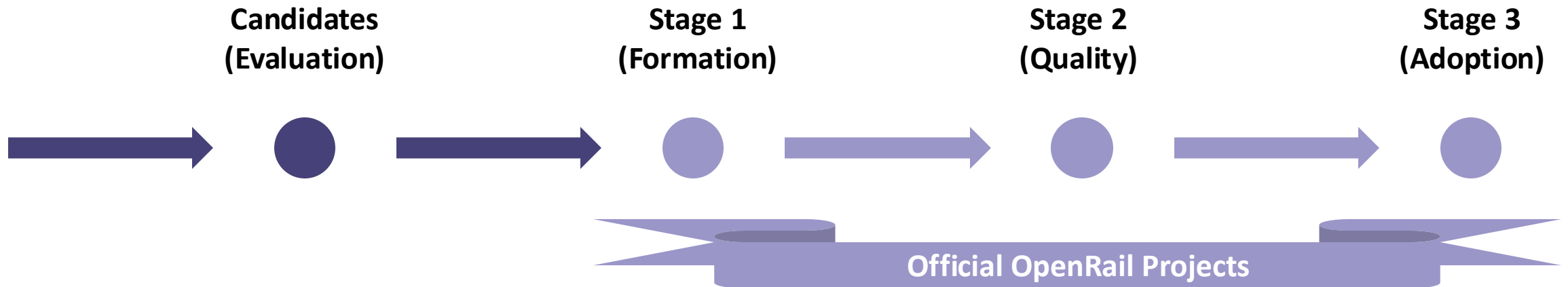- **Open governance** fully **implemented**.
- **Transparent planning** and roadmap shared with the community.
- **Used in production** environments.
- Compliance with key **best practices**:
  - **REUSE** for license and copyright management.
  - **DCO** (Developer Certificate of Origin) for contributor sign-offs.
  - **OpenSSF Scorecard**: Minimum 5/10 for security and best practices.

Stage 3: Adoption

- **Diverse user base** demonstrating real-world adoption.
- **Proven production use** in railway operations.
- **Diverse contributors** from multiple organizations.
- Compliance with key **best practices**:
  - Software Bill of Materials (**SBOM**) included in release artifacts for security and compliance.

Open Governance: Beyond Open Source Code

Open-source licensing enables adoption – but sustainability and collaboration needs Open Governance.

- **Neutral Assets** – Trademarks, domains, and critical assets belong to a neutral foundation.
- **Transparent Decisions** – Decision-making is documented and discussions happen in the open.
- **Inclusive Participation** – Merit-based leadership & diverse stakeholders have a voice.

💬 What are your thoughts on Open Governance? Let's discuss.

Documentation

Project Handbook

- Practical information for OpenRail projects
- Incubation process, onboarding, best practices

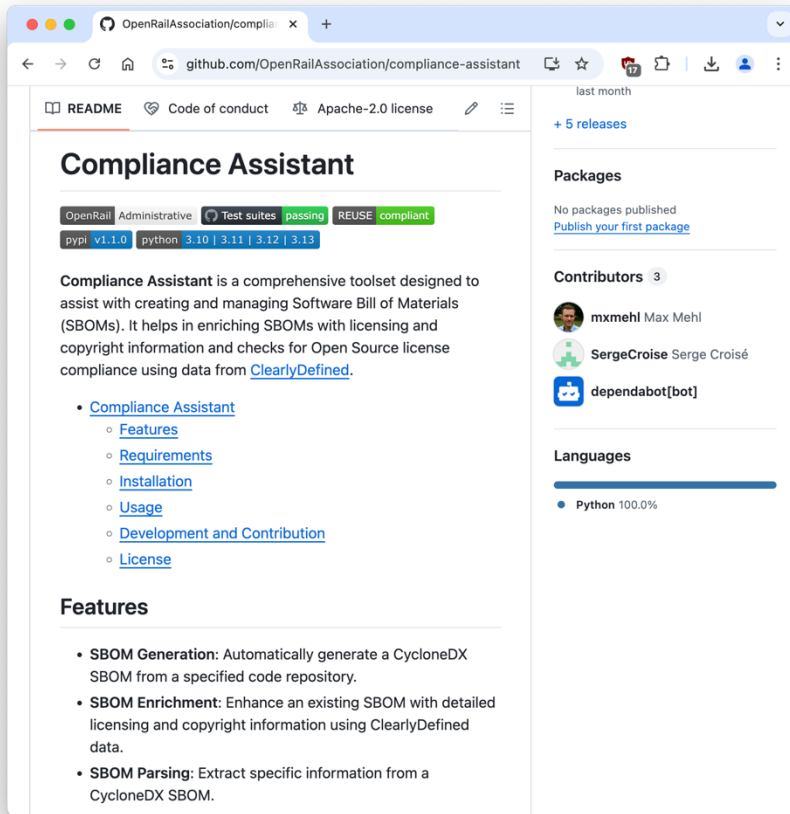https://openrailassociation.github.io/technical-committee/

Open Rail and Transport Landscape

- Overview of OpenRail Projects and other open source projects related to railway and open transport *(under construction)*
- Based on publiccode.yml

https://github.com/OpenRailAssociation/landscape
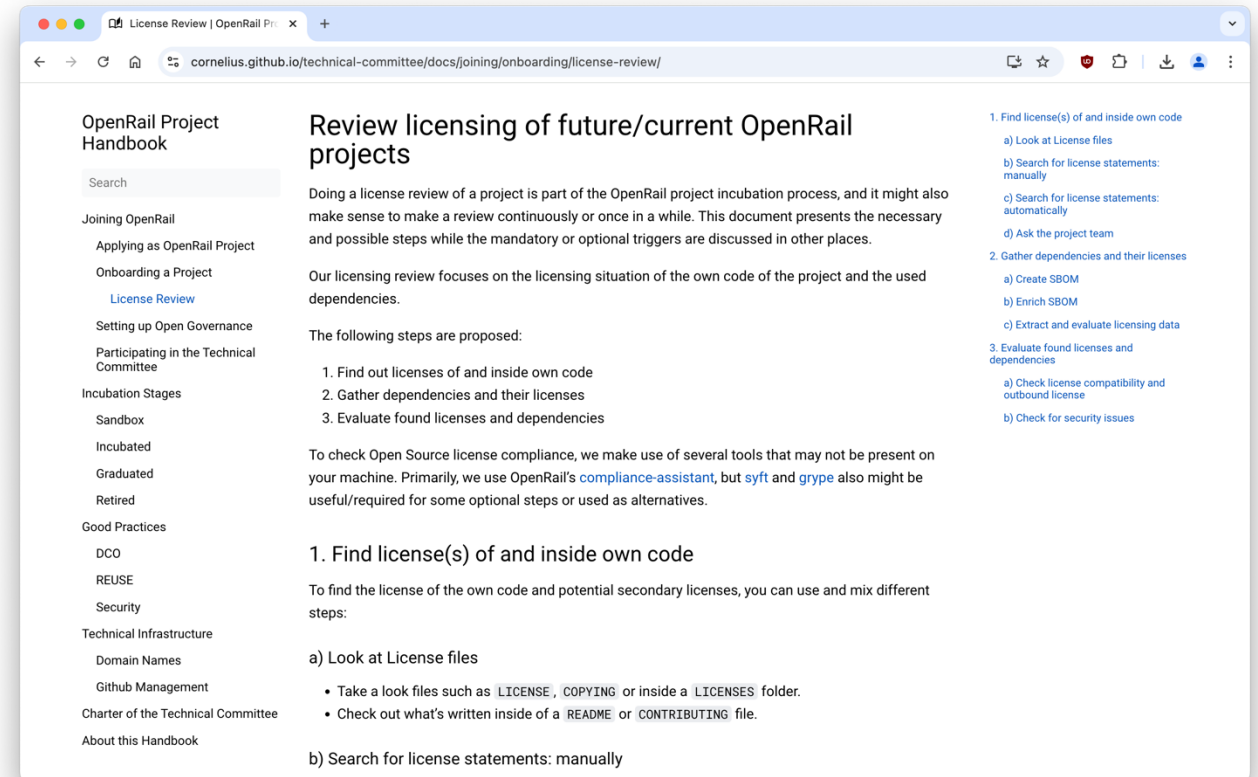
Tooling

Compliance Assistant

- SBOM generation and processing for open source license compliance analysis
- Light-weight SBOM generation with syft or cdxgen
- Uses ClearlyDefined to enrich license information

https://github.com/OpenRailAssociation/compliance-assistant

GitHub Organization Manager

- GItHub organization configuration as code
- Runs as standalone script or as a GitHub Action

https://github.com/OpenRailAssociation/github-org-manager

Technical Committee: Setting the Example

The Technical Committee sets the example for the collaborative culture we aspire to in the OpenRail Association.

- **Transparency** – Decisions and work are public on GitHub
- **Hands-on Mentality** – Action over process, asynchronous work via issues and pull requests, weekly meetings to sync
- **Living best practices** – Applying and demonstrating best practices (e.g. Compliance Assistant, DCO)

A strong foundation, because:

- **It comes from an open source mindset**
- **It connects all projects**
- **It bridges to the organization**

Technical Committee

Bridge organization and technology
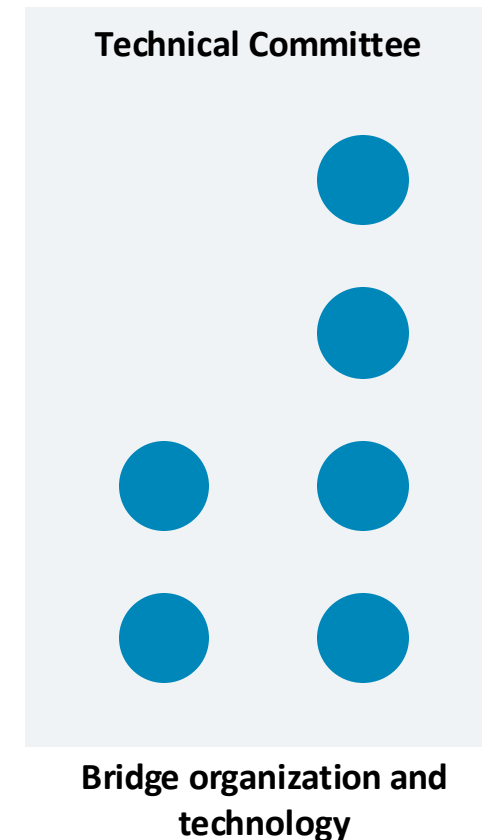
Project vs. Product

Balancing Interests

- Open source requires **balancing the needs of one company** (using/contributing) **with those of the wider community**
- **Integrating open source into internal company processes** (e.g., SAFe) can be **challenging**
- **Separate open source project and open source product**
- It takes **courage** to embrace openness.

Project

- Community-driven, under **open governance**
- Decisions by maintainers & contributors, based on **technical merit**
- **Influence comes from contributions**, not corporate status.
- **Inclusive** — welcomes contributions from diverse stakeholders
- **Balances stakeholder interests while staying aligned with project vision**

Product

- **Company-controlled** — developed & maintained internally
- Can be a **commercial product** or used in **internal operations**
- Influences the project through **contributions & active participation**
- Built on the open-source project, but **technically separate**

Communication: A Core Function of OpenRail

- **More than just project work** – Communication is essential to OpenRail's purpose; it's why we need an organization, not just independent projects.
- **Reaching people inside organizations** – Public discussions often work better than internal channels in large, complex organizations.
- **Bringing like-minded people together** – A shared name and structure create common ground and connection points.
- **Engaging the wider community** – OpenRail serves as an anchor for external collaboration, sparking new projects and strengthening existing ones.
- **Proven impact** – Events like the FOSDEM Devroom and Dreiländerhack have helped incubate new ideas and solidify cooperation between projects.

Conclusion
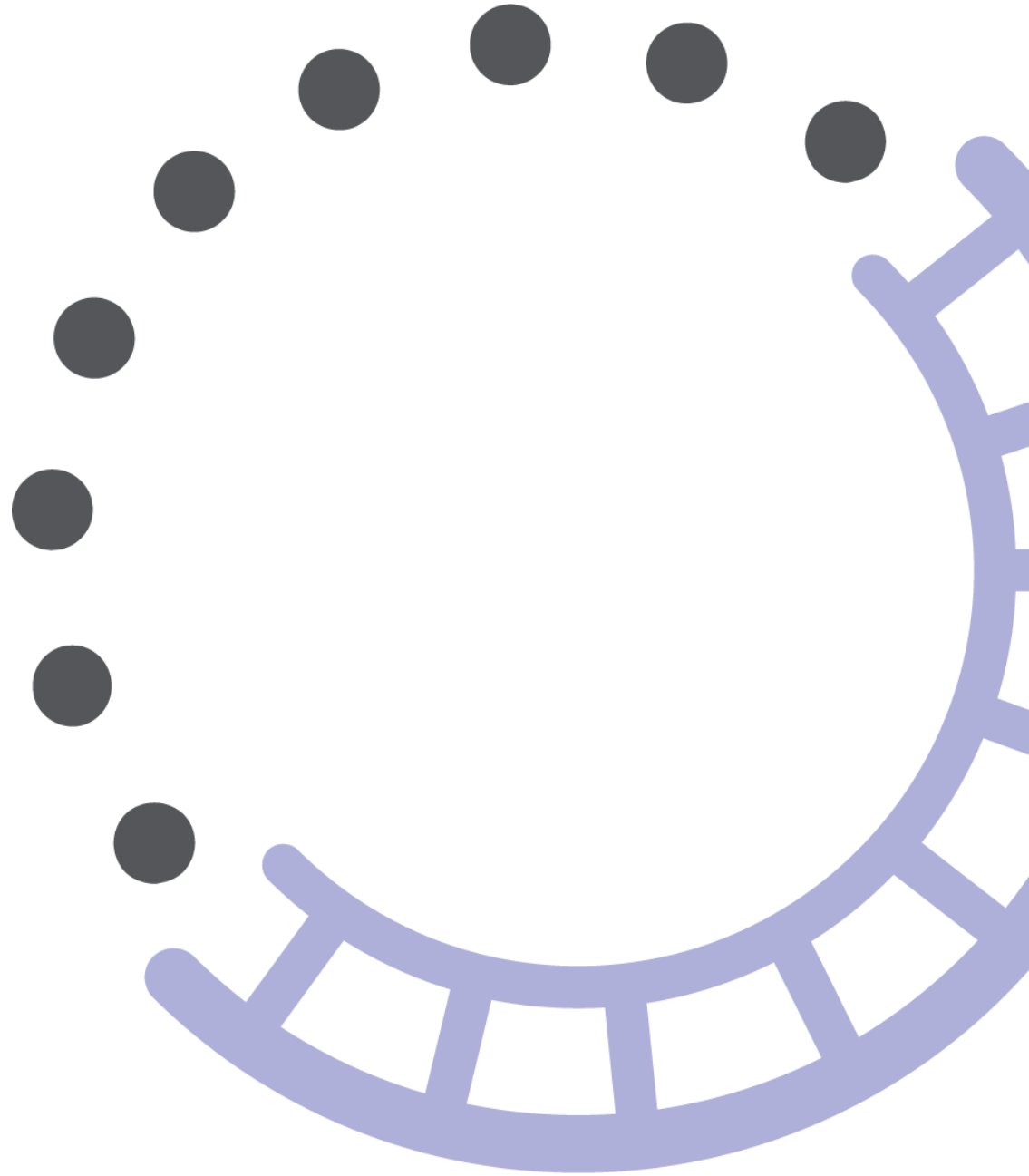
Learn, Share, Improve

Let's learn from each other

Build on what we do

Governance needs to catch up

We have mastered openness in code, but open governance still lags behind

Contact

Cornelius Schumacher
cornelius.schumacher@deutschebahn.com