INCREASE SAFETY IN REGIONAL NETWORKS WITH DECENTRALIZATION

The Autonomous Route Setting Approach

Arne Lamm, Francisco Parrilla Ayuso, Paula Díaz Serrano

Motivation

- Rail sector’s push for efficiency
- Safety-critical tasks and human error risks
- Introduction to the Autonomous Route Setting (AnRS)
  - E.g. for regional lines or shunting yards

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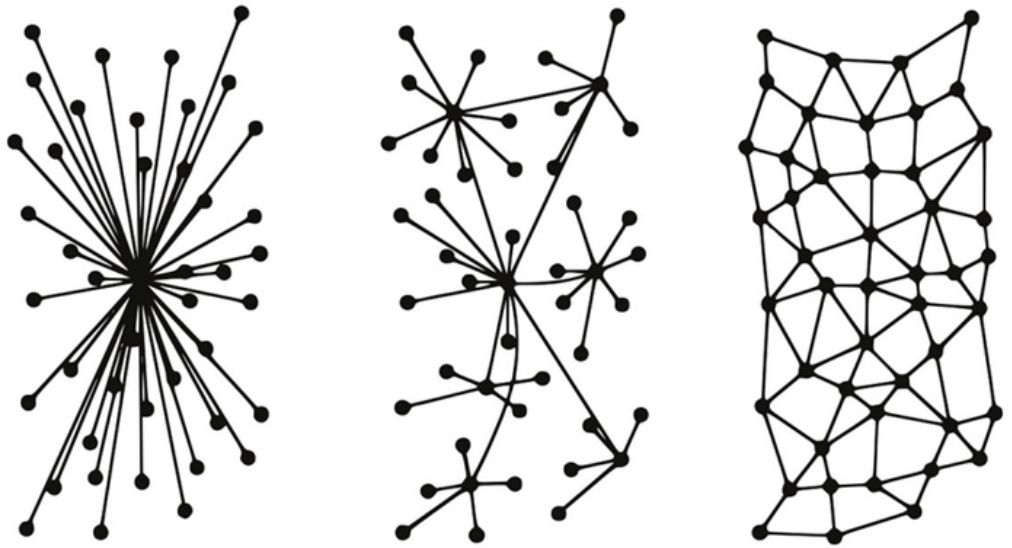
Centralized vs. Decentralized Systems

- Challenges of centralized control in large areas
- Importance of decentralized route setting
- Avoiding human errors and improving safety



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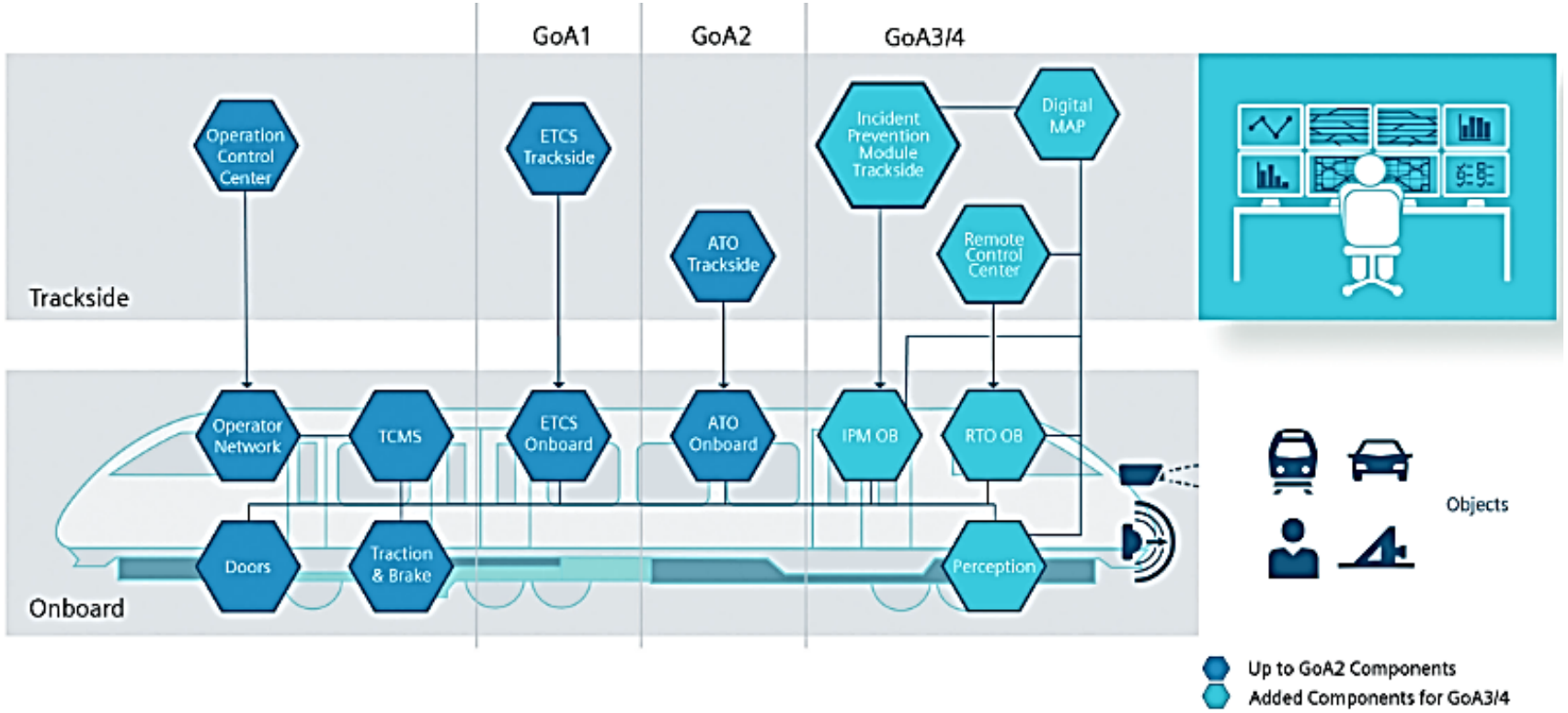
Autonomy (in the Rail Sector)

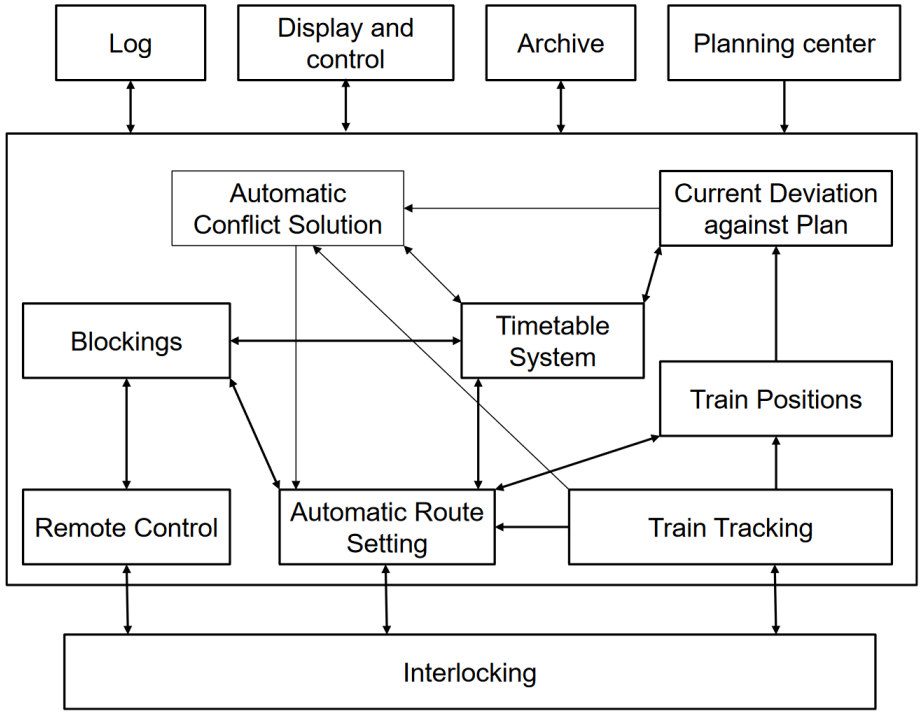
- Definition and levels of autonomy
- Criteria:
  - Adaptability
  - Independence
  - Decision-making



R. Dipl.-Ing. Wolf and H.-G. Dr.-Ing. Langer, "GoA4-Readiness – Herausforderungen für zukünftige Fahrzeuggenerationen," ZEVRail, 1-2, no. 146, pp. 4–9, 2022.

Autonomous vs. Automatic Route Setting

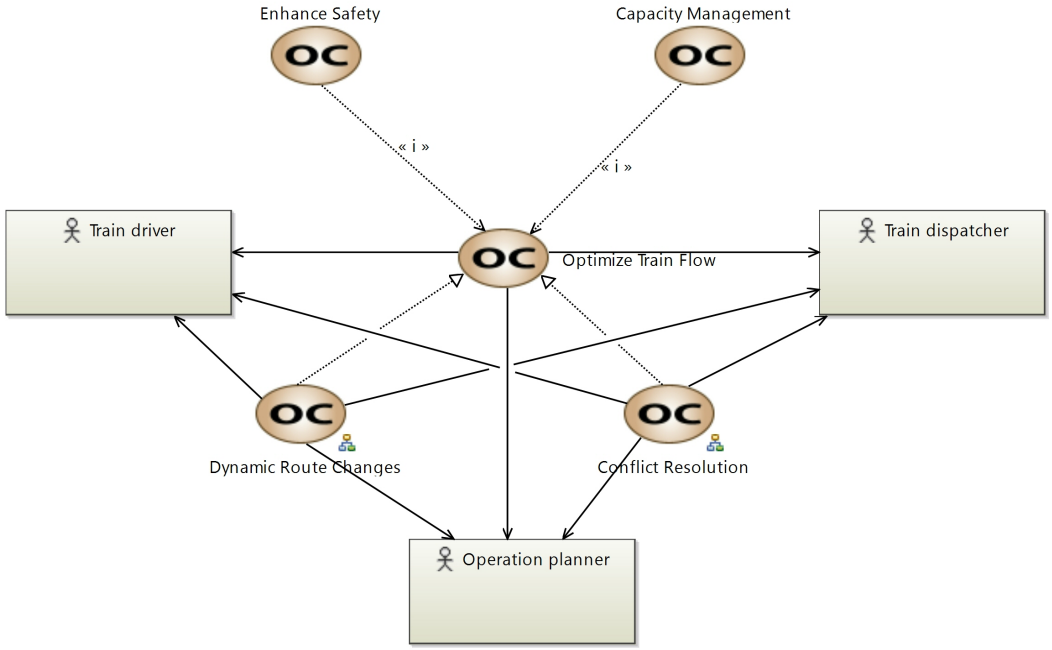
- rule-based approach
- primary objective is to:
  - automate the decision-making process
  - minimizing human intervention
  - optimizing the use of rail network resources



F. Hagemeyer, M. Preuß, M. Meyer zu Hörste, C. Meirich, and L. Flamm, Automatisiertes Fahren auf der Schiene. Wiesbaden: Springer Fachmedien Wiesbaden, 2021.

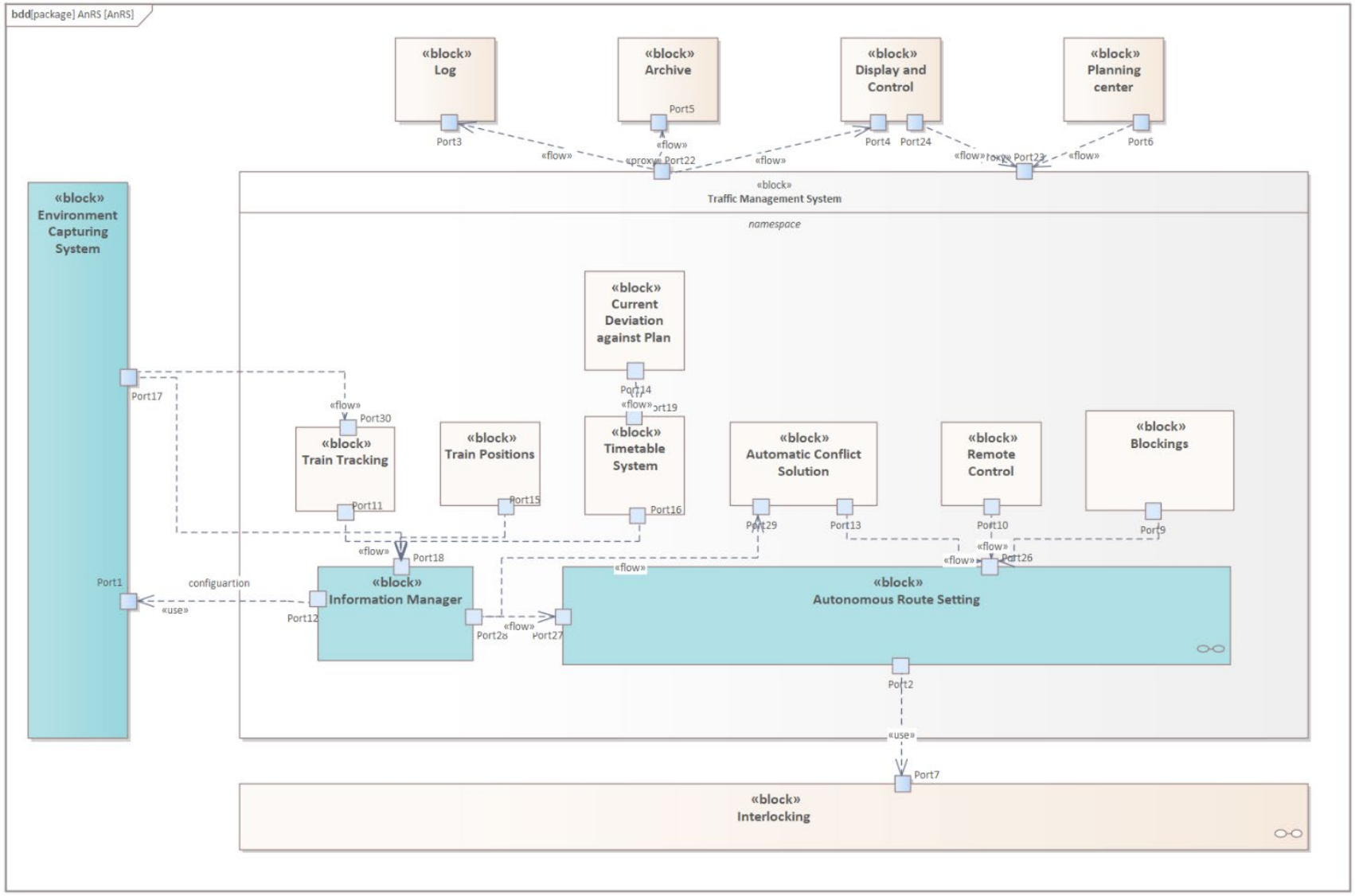
The Autonomous Route Setting (AnRS) Approach

- Decentralized decision-making at each switch
- Communication between AnRS systems
- Integration with existing infrastructure



AnRS Architecture Overview

- High-level architecture of AnRS in railway system
- Integration with traffic management and interlocking systems



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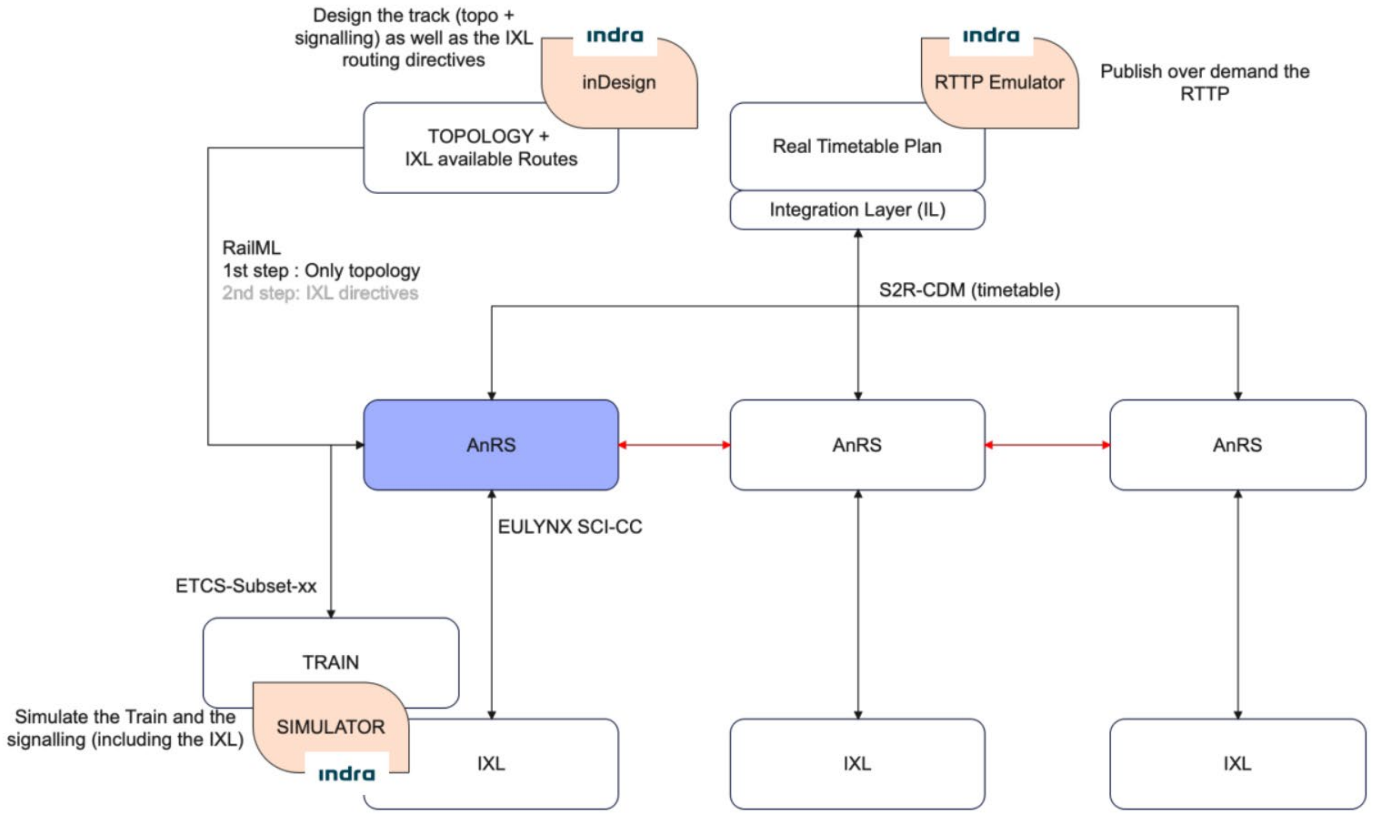
Conclusion and Outlook

- Summary of the AnRS concept
- Future work: prototypical implementation and real-world testing



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Thank you for your attention!

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