Center for Sustainable Future Mobility (CSFM)

STABILITY: Improving railway intervention planning through digitalisation

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1 Introduction

The objective is to enhance the intervention planning process by considering train scheduling and enabling the optimal integration of digital tools. This will streamline the estimation of asset condition and grouping of future interventions, leading to improved efficiency and effectiveness in intervention planning.

2 Requirements

The planning of interventions involves many actors in different organisations, and the decisions made individually and collectively result in information and data that evolve over time.

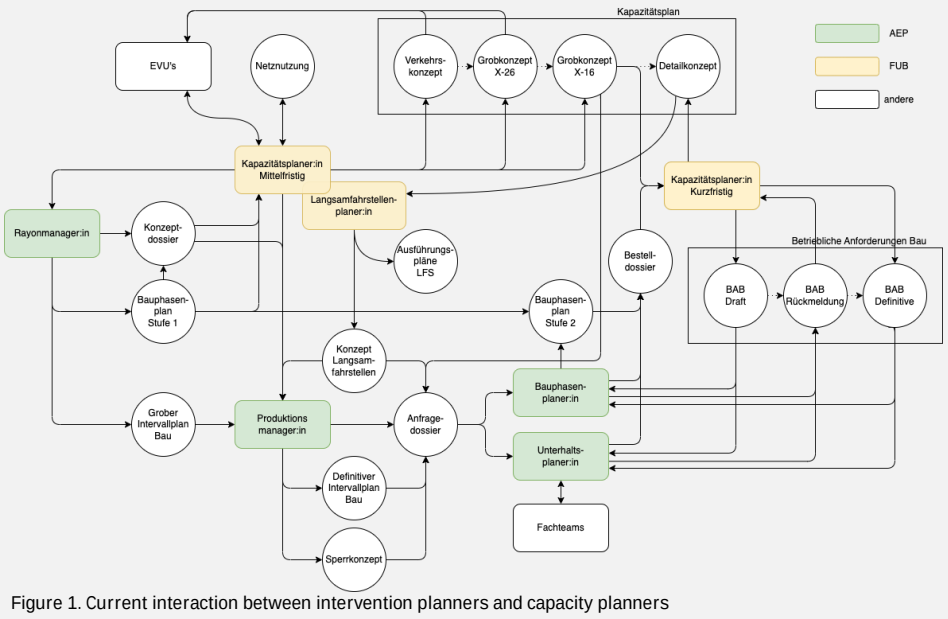

Figure 1. Current interaction between intervention planners and capacity planners

3 Methods

STABILITY facilitates digitalised intervention planning by:

- estimating the current and future condition states and intervention requirements of assets,
- providing an overview of the optimal future intervention programs, associated possession windows, and expected costs, and
- demonstrating the digitalised workflow on an example railway line through the use of Building Information Modeling (BIM).

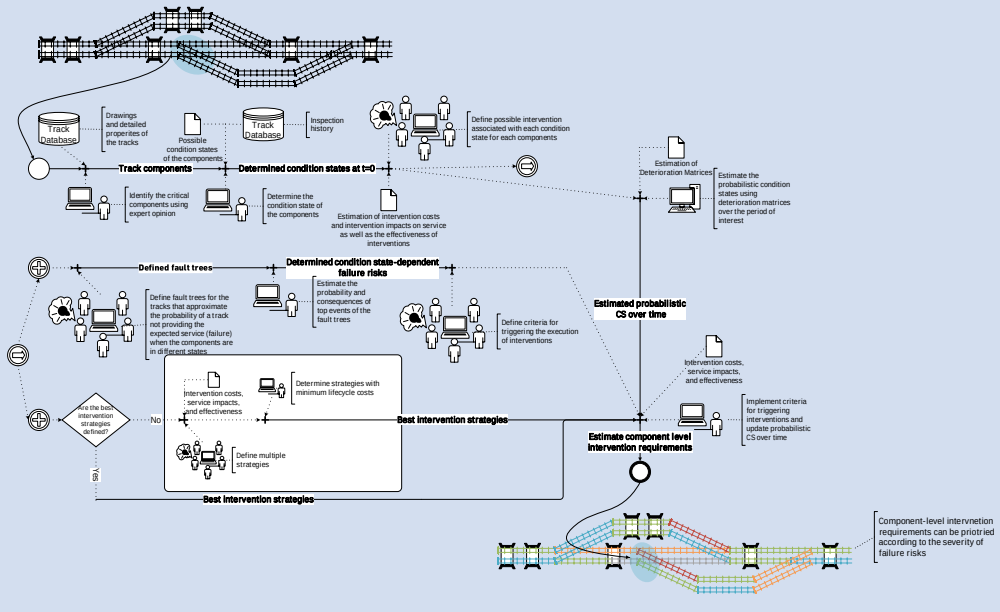

Figure 2. A schematic overview of the proposed intervention planning process

Component- or network-level considerations either necessitate an intervention on other components or prohibit the execution of interventions on other components in the optimal intervention program.

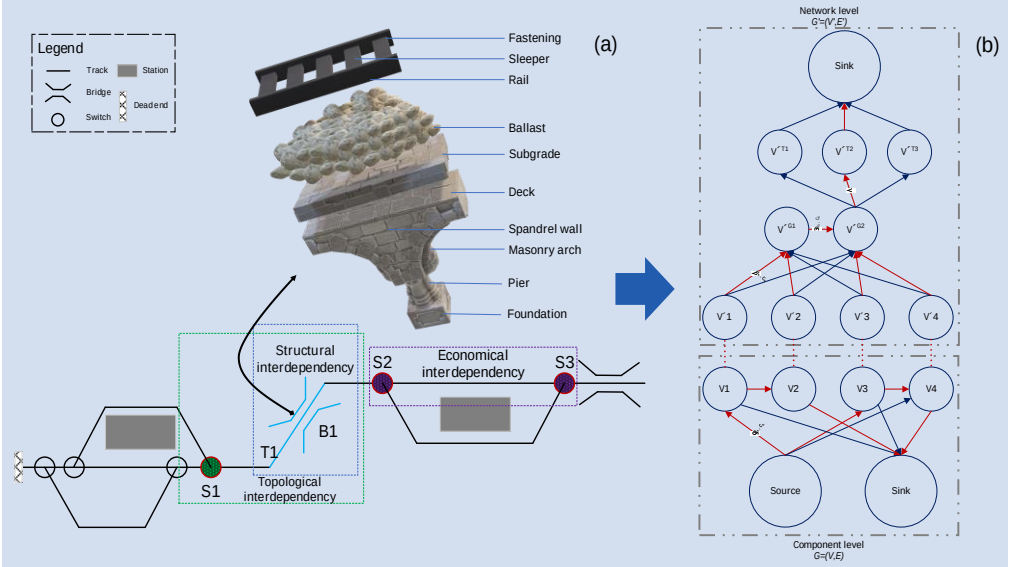

Figure 3. The interdependencies between component-level interventions (a) and the conceptual intervention network (b)

4 Results

The digital tools developed provide a summary of component-level interventions, their optimal clustering, and BIM visualisations using an automated workflow.

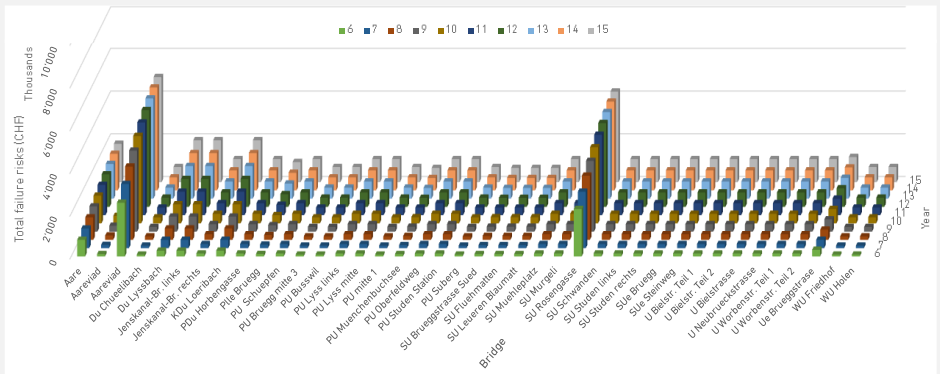

Figure 4. An overview of the failure risk for a portfolio of bridges along the Brügg-Zollikofen corridor

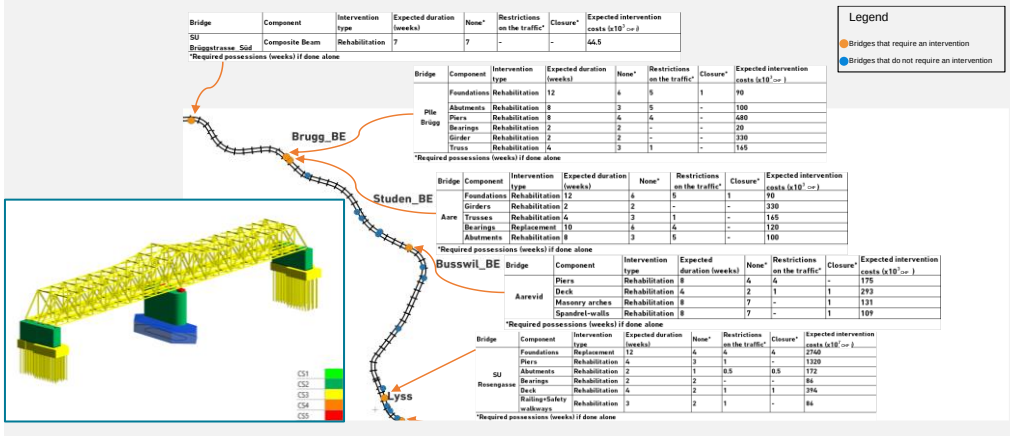

Figure 5. An overview of interventions required on the bridge portfolio and the visualiation of condition states and interventions on BIM

References

1. Mehranfar, H., Adey, B.T., Moghtadernejad, S., & Fecarotti, C. (2024) "Improving the planning of future track interventions using digital tools". 10th Transport Research Arena (TRA 2024), Dublin, Ireland.
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