ETH zürich

Center for Sustainable Future Mobility (CSFM)

Digitally supported intervention planning process

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1 Introduction

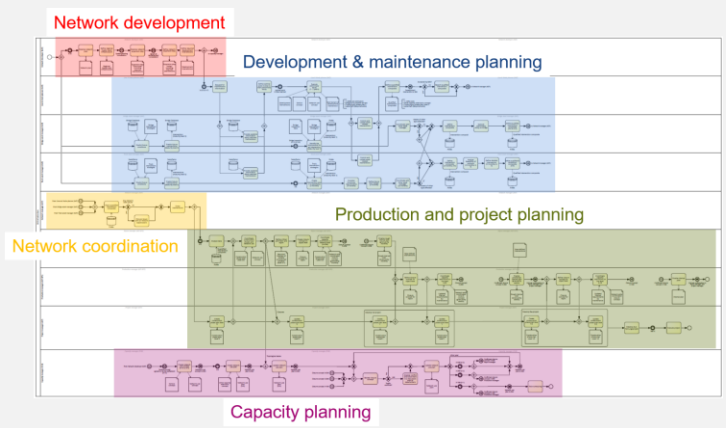
The goal is to develop a new intervention planning process that takes train scheduling into consideration and enables the optimal integration of digital tools, to facilitate the automation of future intervention prediction and their optimal grouping as efficiently and effectively as possible.

2 Steps and progress

1. Understand the current intervention planning process.
2. Develop optimal maintenance strategies.
3. Determine intervention clusters.

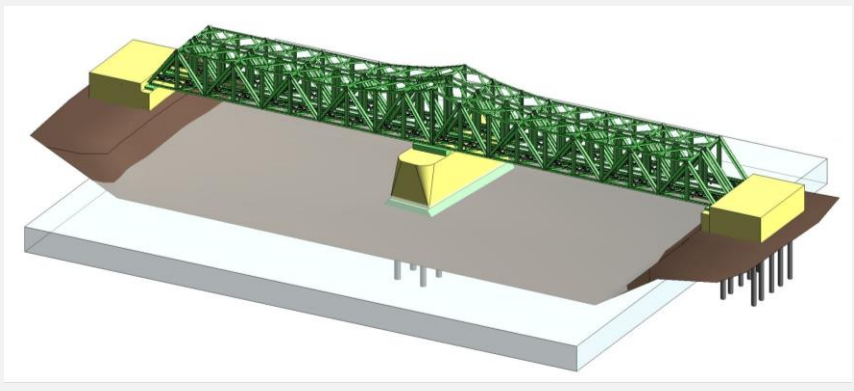
3 Process

- The intervention planning requires a high degree of interaction between actors across different divisions, where information and data flow from one to another and evolve over time.



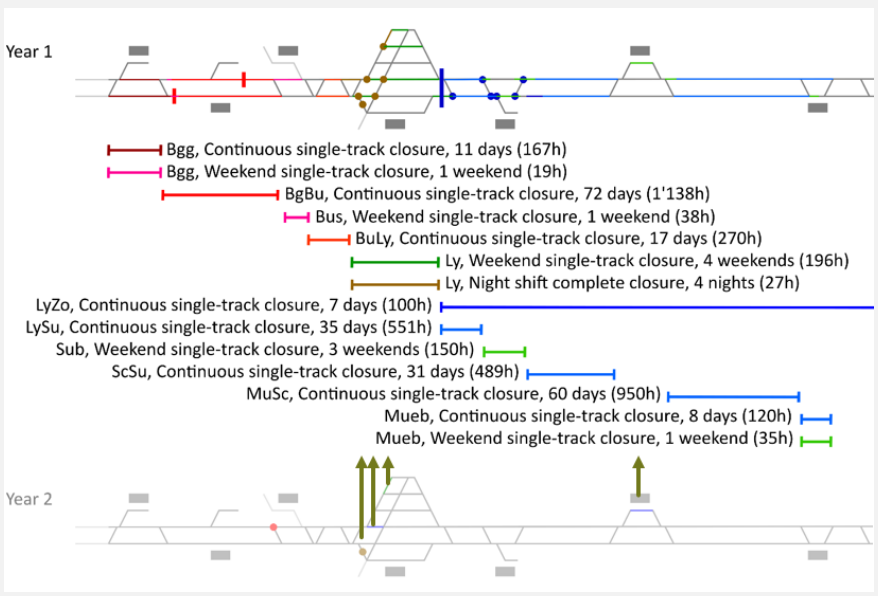
4 Estimating future interventions

- The maintenance interventions consider assets on the component level.
- Both gradual and sudden deterioration processes are considered in the prediction of future interventions.



5 Digitalised determination of intervention programs

- Intervention programs of a network are developed considering:
  (1) dependencies between railway network assets and
  (2) the organizational constraints.
- The efficiency of benders decomposition applied to the branch-and-bound algorithm is evaluated.



6 Conclusion and expected impact

- Understanding the current intervention planning process helps identify where improvements could be made with digital tools.
- Infrastructure managers are able to better plan future maintenance interventions by considering assets on the component level.
- Benders decomposition improves the computation time of determining optimal intervention programs in a network.

7 Future work

- Estimation of current and future condition states of asset components with intelligent use of different levels of data availability.
- The estimation of future interventions on the component level on an asset could be extrapolated to the network level.

References

1. Chuo, S., Burkhalter, M, and Adey, B. T. “Current SBB intervention planning process in view of the STABILITY project”. Technical report.
2. Burkhalter, M., and Adey, B. T. "A network flow model approach to determining optimal intervention programs for railway infrastructure networks." Infrastructures 3.3 (2018): 31.

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