

RESEARCH TOPICS 2024

The SBB – EPFL Research Initiative offers a broad variety of research topics and questions for projects.

The focus of this research Initiative consists of the following subjects:

- Increasing the flexibility and resilience of the railway system.
- Ensuring the robustness of the railway infrastructure and increasing efficiency and productivity.
- Exploiting the potential of technology and digitalization for integrated mobility.
- Sustainability and circular economy along the entire value chain.

We aim on creating a framework allowing the project teams to bring together knowledge and expertise from academia and business. Therefore, we address SBB's needs for research in the list of possible research questions.

Whenever a project idea, an expression of interest or proposal is submitted, it must relate to one of these subjects, and create value for both parties equally.

1. Customer oriented Railway:

Research, to develop new, customer-oriented offers and services, and to make trains even more attractive (safe, punctual and clean).

- How can SBB maintain customer confidence in collective transport after a crisis (cyber-attacks, health concerns etc.)?
- Review of differentiating factors of railway transport in tomorrow's mobility system.
- Concepts to cope with long term structural capacity constraints also with regard to leisure traffic.

2. Simplified access to Railways:

Research, to simplify access to railway and promote integrated mobility through physical and digital network of SBB. For example:

- Which models are relevant to combine mobility modes and facilitate the access to railways?
- What is the future of international transport as a substitute or supplement to air transport?
- What is the impact of strategically positioned parking areas (cars, (e)- bikes, shared mobility...) on the modal shift and how to define those locations?

3. Flexible offers and production models:

Research to develop more flexible supply and production models.

- How to make timetables more robust (more reserves, dynamic management)?
- How to design more agile delivery systems in order to enable realtime demand-driven operations, allowing for example conflict prediction and resolution?
- Methods or approaches to cope with the population and demand growth given capacity restrictions in the future.

4. Resilience and Efficiency:

Research to increase resilience in railway system, the robustness of rail infrastructure and for the efficiency in the use of funds.

- How to design the new assets for service and use automatization to drive maintenance speed up and costs down (data of entire rail asset life cycle, IoT...).
- How to reduce/cope with network capacity losses due to construction works or unplanned disruptions?
- How can the resilience of SBB be increased on an organizational and on a network level?

5. Long-term strengthening of SBB:

Research to use new opportunities and avoid risks from mobility related, social and socio-economic developments, according to the hypothesis of integrated long-term planning.

- What is the contribution of rail transport to solve problems of population growth, new forms of life and work, and how will mobility develop, and will it come with disruptive changes?
- How to achieve doubling the share of public transport in the modal split in Switzerland?
- How to secure or retain implicit knowledge in a generation change of employees?

6. Environmental Sustainability:

Research to increase the ecological sustainability of SBB and achieve climate neutrality by 2030.

- Which existing circular business models (CBMs) from other resourceintense industries can be applied to the challenges at SBB (building construction and civil engineering)?
- How to leverage new technologies and alternative materials to improve the transparency and circularity of SBB assets?

7. Optimized freight logistics:

Research to further automate freight transport and to better align it with market needs, along the entire value chain. For example:

- How much are freight forwarders and shippers willing to pay to be 1 minute faster in transport (Value of travel time savings VTTS)?
- How to organize the last mile in cargo logistics?

Submit the document to:

If you have questions regarding the process or academic aspects, please contact s.lavanchy@epfl.ch

If you wish to get in touch with SBB to discuss potential project ideas, please contact forschung@sbb.ch