Engineers working on buildings and infrastructure no longer start projects with pen and paper and blueprints but go straight to the computer and start creating 3D models and databases.

But railway engineering is stuck with old software tools, struggling to adopt modern ways of working. We have identified two major causes for this, and have made progress towards more agile railway construction.

Firstly, diverse, complex regulations are needed for correct and efficient railways, and each country has its own traffic lights, safety principles, control systems, and so on. We have used incremental Datalog to make a system where the myriad of rules can be specified and checked efficiently. Using controlled natural language, the rules can be written in Norwegian or English, making programming easier.

Secondly, railways need to be constructed carefully to make sure they handle the needed traffic capacity. Traffic planning is complex in itself, and doing it alongside construction planning currently takes an effort that many projects cannot afford. We have made a system based on SAT solvers which solves traffic puzzles so fast that engineers get immediate feedback to improve their design.