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DISSERTATION TITLE:	*Automated Reasoning in Railway Construction Planning*

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.