The project: smARt RAilroad maintenance eNGinEERing with stochastic model checking.

How can we model and analyse big railway systems and:

- Compare the effects of different maintenance strategies?
- **Obtain smart maintenance strategies?** Best balance between maintenance cost and reliability
- Improve reliability and availability?
- Reduce costs of maintenance and failures?

Methods: fault trees, maintenance models, and stochastic model checking.

Results: Decision support for maintenance policies.

- We have developed fault maintenance trees (FMTs).
- We have developed tools to analyse FMTs to compute:
 - Reliability, availability, expected number of failures
 - Breakdown of most common failure causes
 - Costs of maintenance and failures
- We have performed case studies on El-Joints and pneumatic compressors.



Electrically insulated joint



Pneumatic compressor

Impact:

- Tools to compare different maintenance policies. Based on stochastic and statistical model checking
- Insight into dependability documentation inside ProRail. Effects of interdependent failure modes
- Validation of ProRail's maintenance strategy for El-joints.

Next steps:

- Improve automation of analyses.
- Use Big Data to obtain model parameters.
- Reduce computation time for analysis.

Date finish project (expected): 31.10.2016





ProRail



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