# The Network Modelling, Timetabling and Fuel Saving Computer Programs on the Market

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# BACKGROUND

## ARTC's Network Modeller

- 11 years of Network Modelling, 9 years at ARTC
- Come across numerous programs on the market
- Seen their evolution
- Noticed overlaps between them
- Seen a lot of confusion as to what can do what
- Started keeping a list of what was on the market
- Grew into a paper

# RAILSYS

- My main program
- So I generally relate everything else to it
- Developed by the University of Hanover's School for Traffic and Railway Engineering (IVE)
- Developed around Deutsche Bahn requirements
- Originally known as Simu++
- Now supported and marketed by RMCon
- Local office headed by Uli Mohr

# HOW RAILSYS WORKS 1

3 Parts

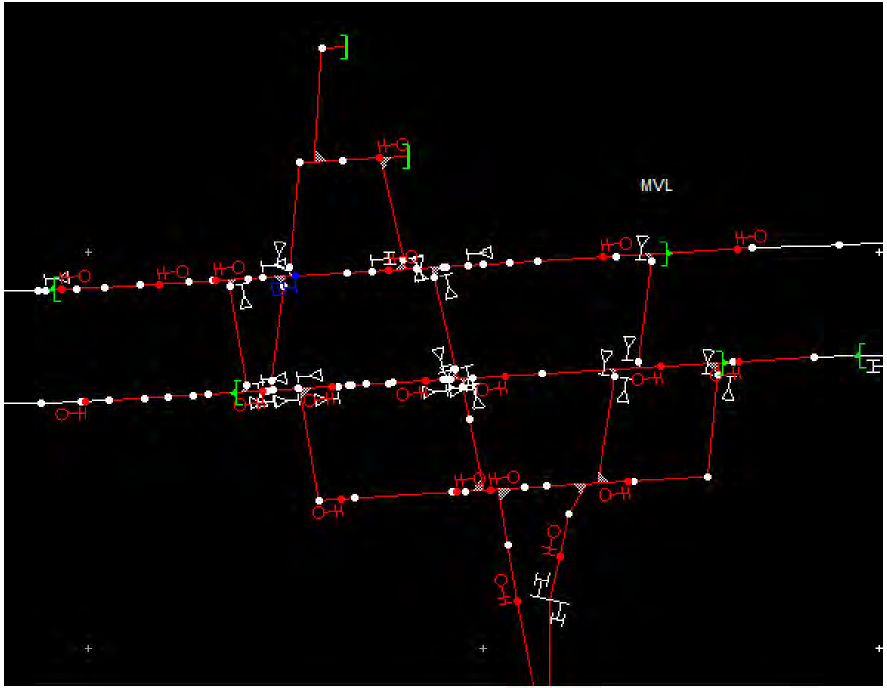
- Infrastructure Module
- Timetable and Simulation Module
- Evaluation module


From the RMCon Company Website

# HOW RAILSYS WORKS 2

Infrastructure Module

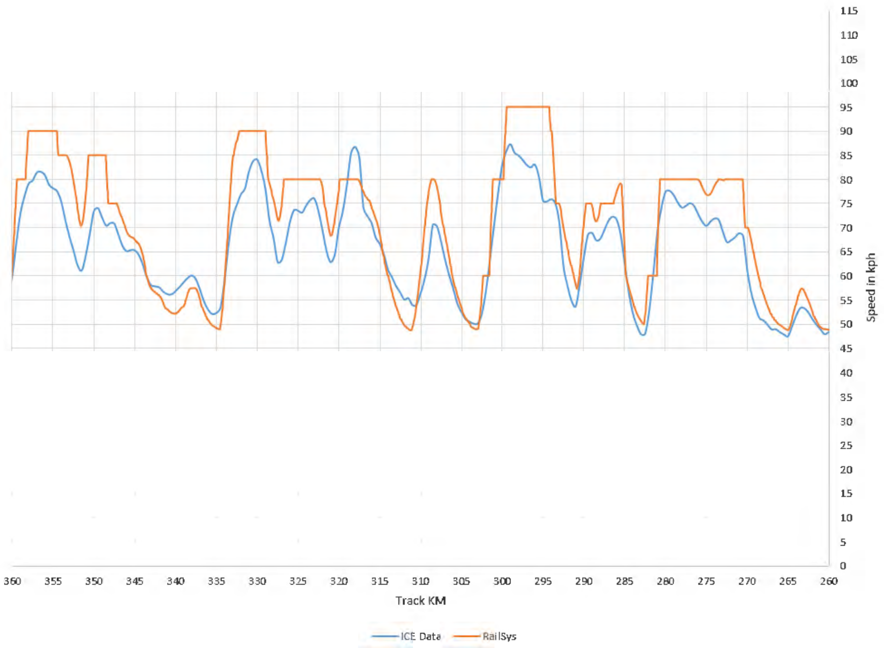
- Create a computer model of the rail network
- A series of nodes connected by links
- Links have gradients, speed limits and lengths
- On top of this go signals and block sections, stopping locations, points and train routes



# HOW RAILSYS WORKS 3

Train Performance

- Provide locomotive details such as tractive effort curve
- Provide train details, including length, and weight
- Calculates train performance

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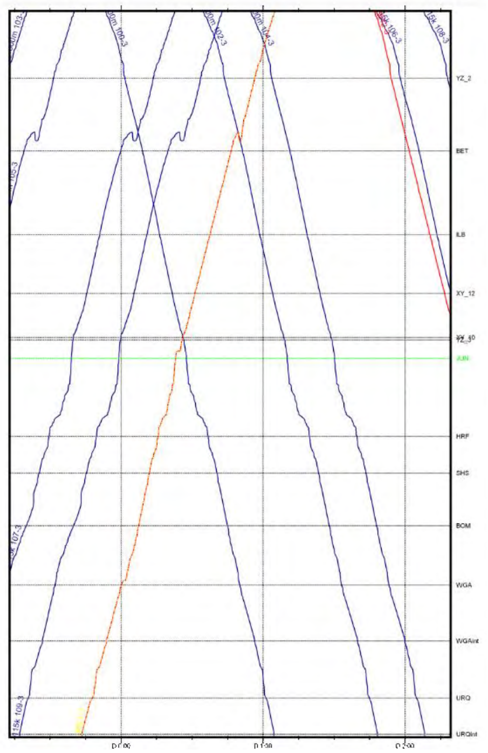
# HOW RAILSYS WORKS 4

Timetable

- Enter in a timetable
- Automatically identifies conflicts
- Allows you to fix conflicts

Dynamic modelling

- Add random delays
- See the knock on effects of delays
- See how well the timetable can recover

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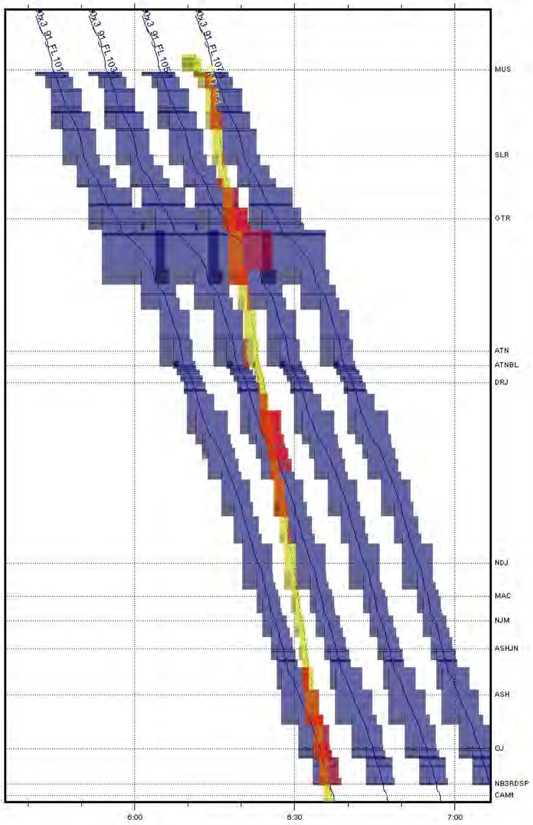
# HOW RAILSYS WORKS 5

What it is used for

- Analyse train performance
- Study Network Capacity
- Identify bottlenecks on the network
- Analyse the robustness of a timetable
- Compare different timetable options
- Compare different infrastructure enhancement projects

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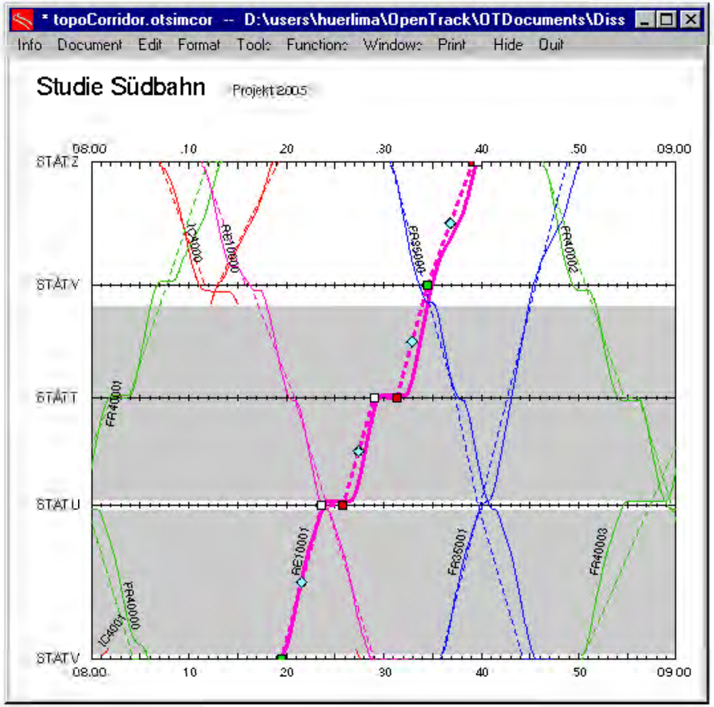
# ALTERNATIVE PROGRAMS

- Several competing programs on the market
  - OpenTrack
  - Berkley
  - RAIL//NET
  - ARTC adopted RailSys because we inherited several models




From the OpenTrack Company Website

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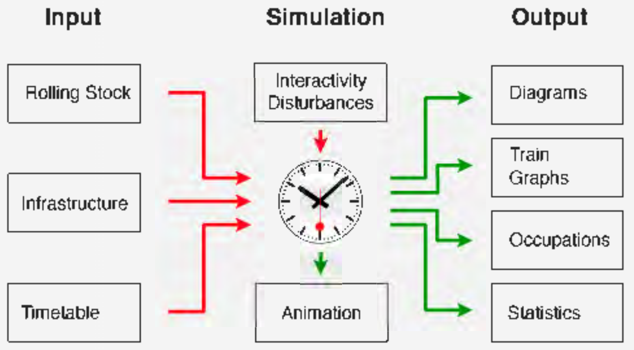
# ALTERNATIVE PROGRAMS - OPENTRACK

- The main rival in Australia
- Very similar
- Developed in Switzerland for Swiss Railways requirements
- Marketed by in Australia by Plateway
- Phil Imrie and Ian Imrie are the local agents




From the OpenTrack Company Website

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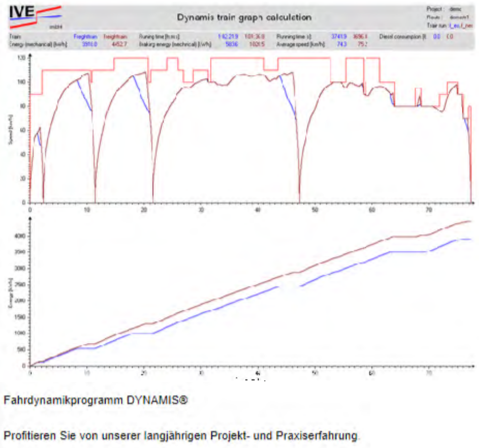
# TRAIN PERFORMANCE CALCULATORS

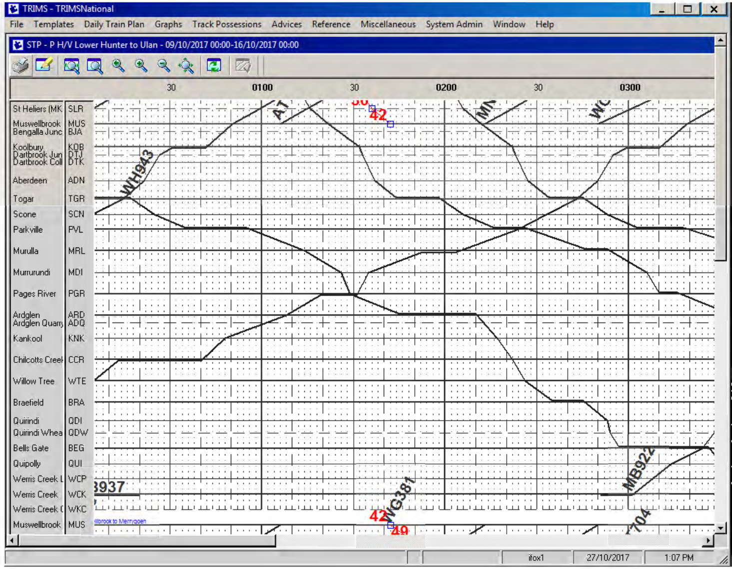
- Just calculated train performance
- Include MTrain, Dynamis, ZLR
- Sectional run times, signal clearance times, maximum speed etc
- Some developed well before Network Modelling programs were available, like MTrain
- Some developed to do more in depth modelling of train performance, like Dynamis
- RailSys and OpenTrack developed into stand alone Train Performance Calculators




From IVE website

# TIMETABLING TOOLS

- Deigned to write timetables and draw train graphs
- Do not calculate train performance or identify conflicts unless linked to another program
- ViziRail and TRIMS are common in Australia
- DTPOS web based interface
- Viriato is a common European program, compatible with OpenTrack
- RailSys has been developed into a timetabling tool as well, with internet based customer portals for train requests



# ENERGY AND FUEL SAVING TOOLS

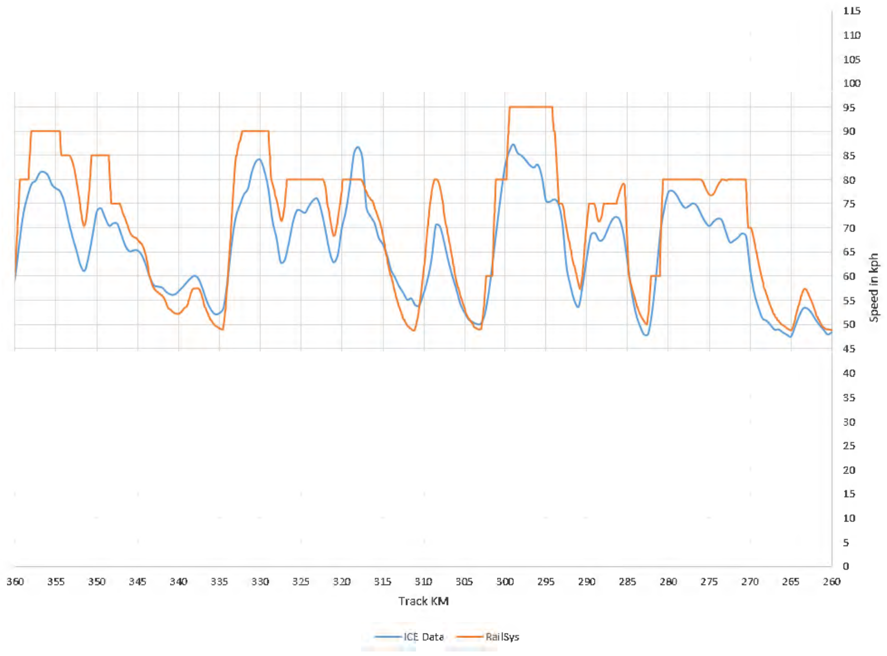
- Models the trains performance, network geography and train timetable
- Work out how to drive to minimize fuel / energy use whilst maintaining timetable
- Advise driver where to power, coast or brake
- Can also be used for timetable development
- Fuelmiser / Energymiser in Australia, LEADER by New York Air Brake Company and GE Trip Optimizer
- Drivers often say “it’s no use to me but would be a big help for the new guy”

# TPAT, SKETCH AND SCHEDULEMISER

- Various programs designed to analyse a network quickly
- Much more simple than full Network Modelling programs
- TPAT requires sectional run times to be manually loaded as well as train departure times
- TPAT can be used to quickly compare the robustness of departure times and the best locations to put new passing loops

# DATA RECORDERS

- Provide real world data which can be used to calibrate models
- Real world data can be analysed on its own
- What data recorders are in place vary between rail operators and rail systems
- Locomotives running on the ARTC network have ICE radios and ICE radio data can be used for train performance analysis



# DISCREET EVENT AND PROCESS SIMULATORS

- Designed to model processes such as factory production or supply chains
- Allows people to do what if scenarios in case one input is changed or if something breaks down
- Arena by Rockwell Automation
- SolveIT by Schneider

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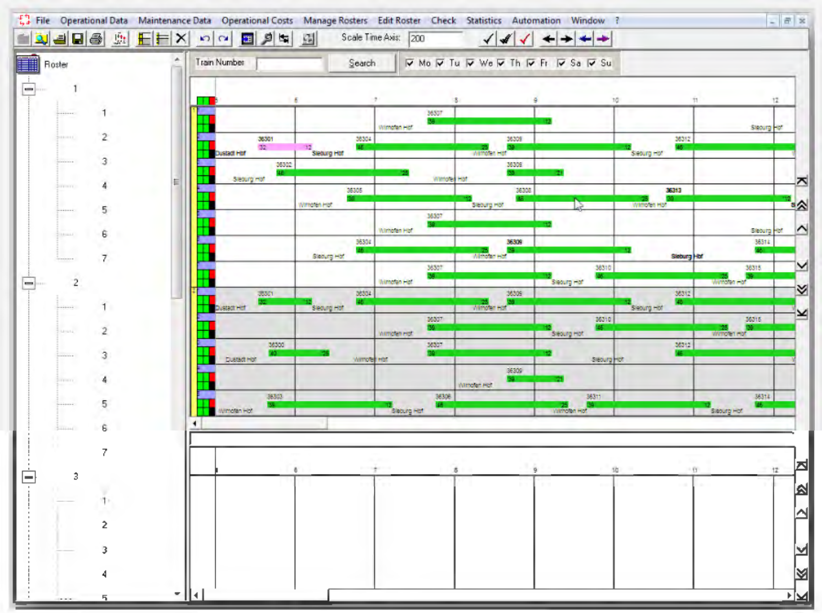
# ROSTERING TOOLS

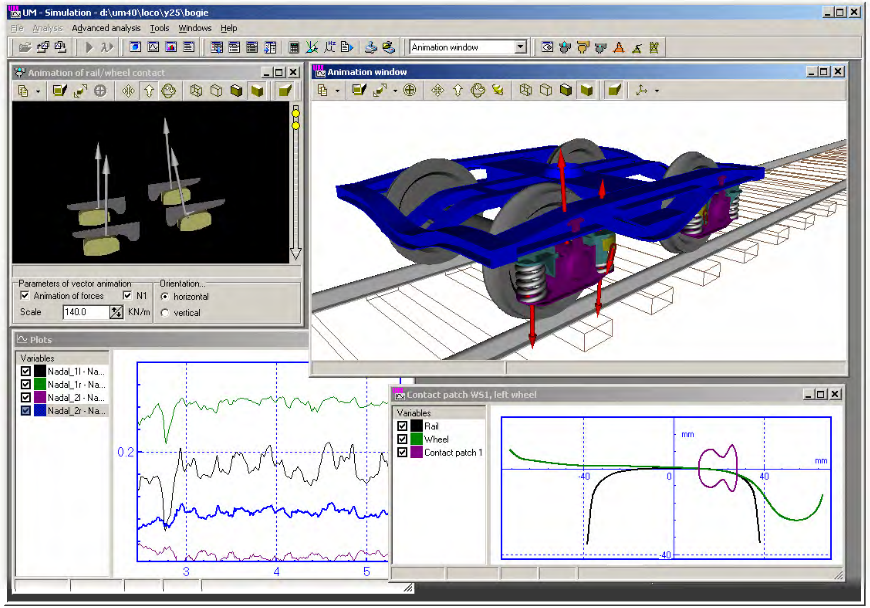
- Deigned to work out rollingstock allocation or crew shifts
- Dispo, developed by IVE alongside RailSys
- Viriato
- TPAC RailCrew and RailMate




From the SMA Company Website, suppliers of Viriatio

# DYNAMIC MODELLING TOOLS

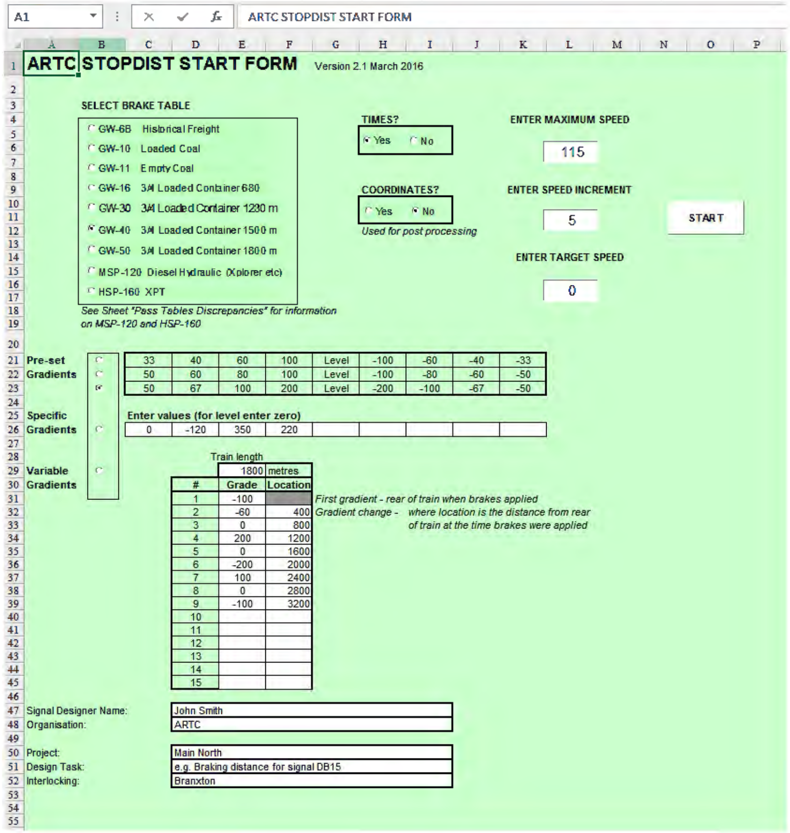
- NUCARS, Vampire, GenSys, Vi-Rail, Simpack, Universal Mechanism
- Some rail specific others vehicle in general
- Radically different from other programs covered
- Model how trains “bounce down the track”
- Look at such things as fatigue loading, vehicle stability, suspension, draw gear forces, the effect of track defects




From the Universal Mechanism Company Website

# IN HOUSE TOOLS

- Even with all the programs on the market it is often hard to find something which meets your needs
- Numerous programs developed in house by different rail operators
- Example ARTC's Braking Distance Calculator

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# CONCLUSION

- Brief overview of what is on the market
- Programs covered are constantly evolving
- New functionality added to existing programs
- Programs often now do several tasks
- Can be hard to keep up with what is on the market

# ACKNOWLEDGMENTS

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