Railfreight Decarbonisation

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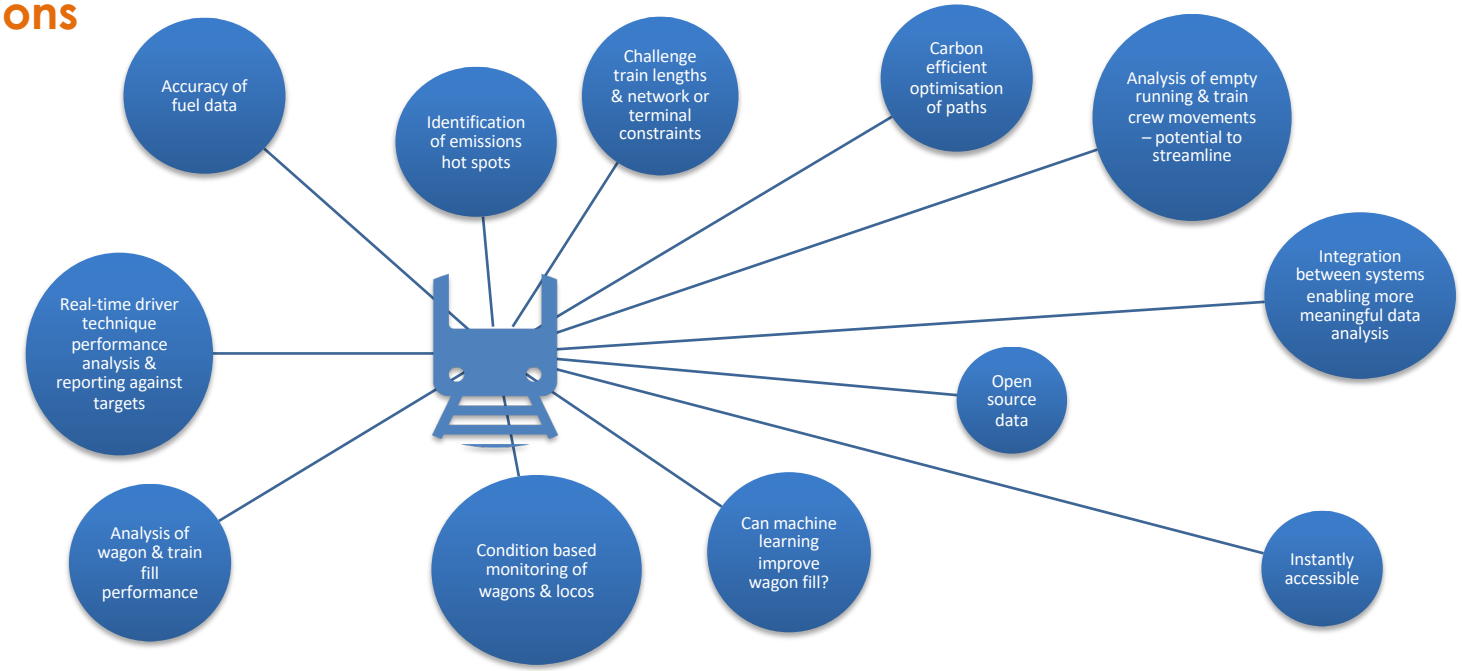
Themes
Data Management & Telematics
Locomotives & Wagons
Driver Management and Path Improvements
Terminal Management and Improvements

Data Management & Telematics – Potential SME Innovations to reduce emissions



Problem Statement: Good data is available, but often in isolation and can be difficult to obtain. Meaningful data analysis to enable more carbon efficient train running is therefore challenging and always well after the event. Quick and relevant access to data and intelligent analysis & reporting has the potential to result in significant emissions reductions.

Locomotives and Wagons

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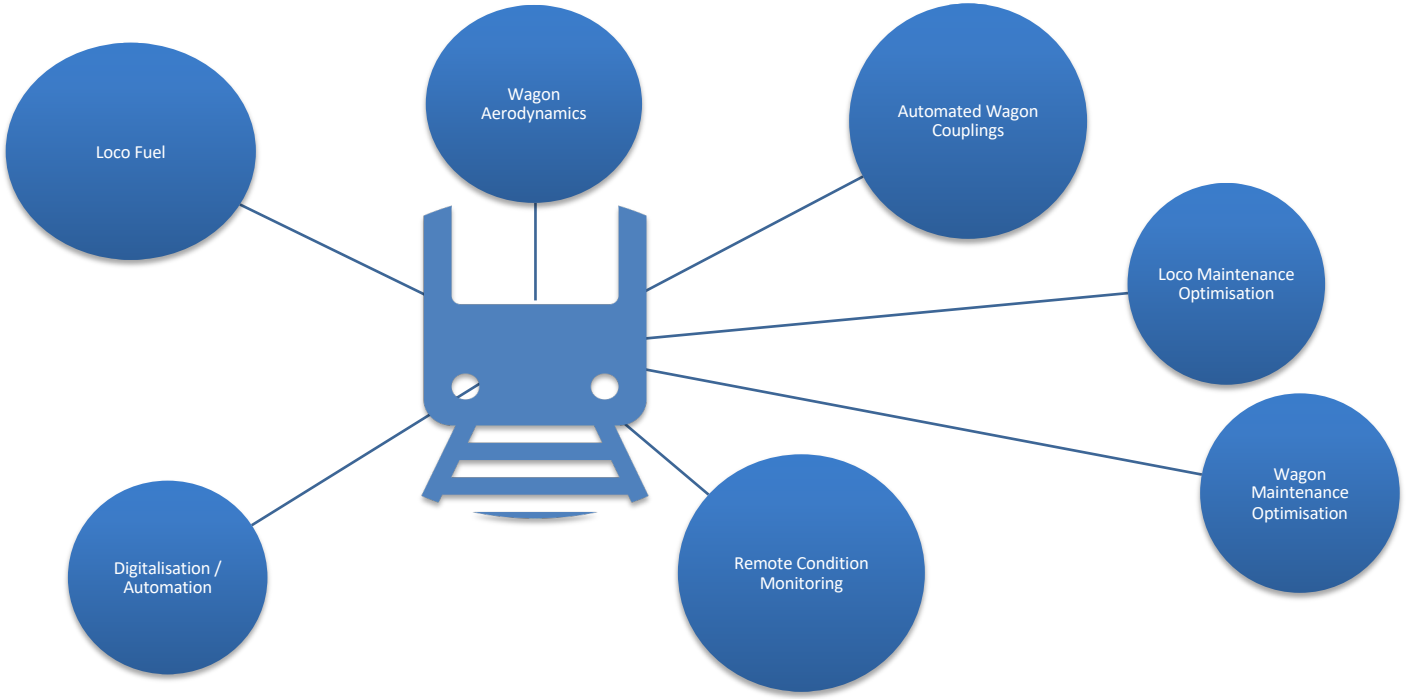
Locomotives and Wagons – introduction / overview

- Freight locomotives are primarily diesel powered
  - Most freight routes do not have electrification for the entire route
  - On routes where electrification is available, there is still a need for a "last mile" non-electric locomotive

- Freight wagons, primarily three types for Tarmac
  - Hopper wagon
  - Box wagon
  - Cement tank
  - Other non-Tarmac wagon types include Intermodal, Petroleum, Steel, Automotive, Infrastructure, Biomass, Nuclear

- Wagons are loaded at railheads, sometimes with a mainline loco, other locations with a shunt loco

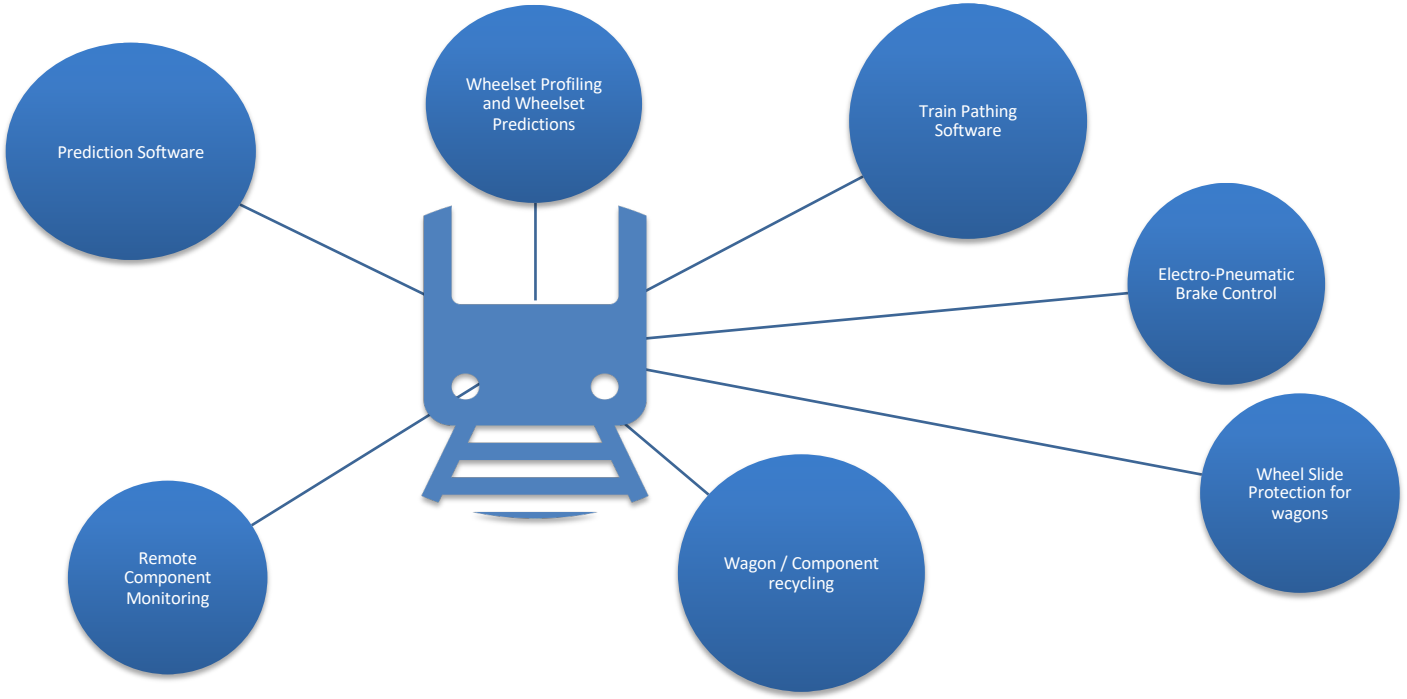
Locomotives and Wagons – SME Challenge, ideas to develop



Problem Statement:

Operators are working on short and long term solutions for alternative locomotive fuel sources, what about the medium term for the next 10, 15 and 20 years. Many freight trains deliver directly into the heart of City Centres, what impact does this have on air quality from loco emissions.

Locomotives and Wagons – SME Challenge, ideas to develop



Problem Statement:
Wheelsets are an expensive component and pivotal to the safe running of freight wagons and locomotives, but these wheelsets do not become bad or out of size overnight. Can software predict wheel wear and predict condition based maintenance as well as monitor for defects.

Introduction to Driver Management

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Driver Throttle Usage & Train Handling

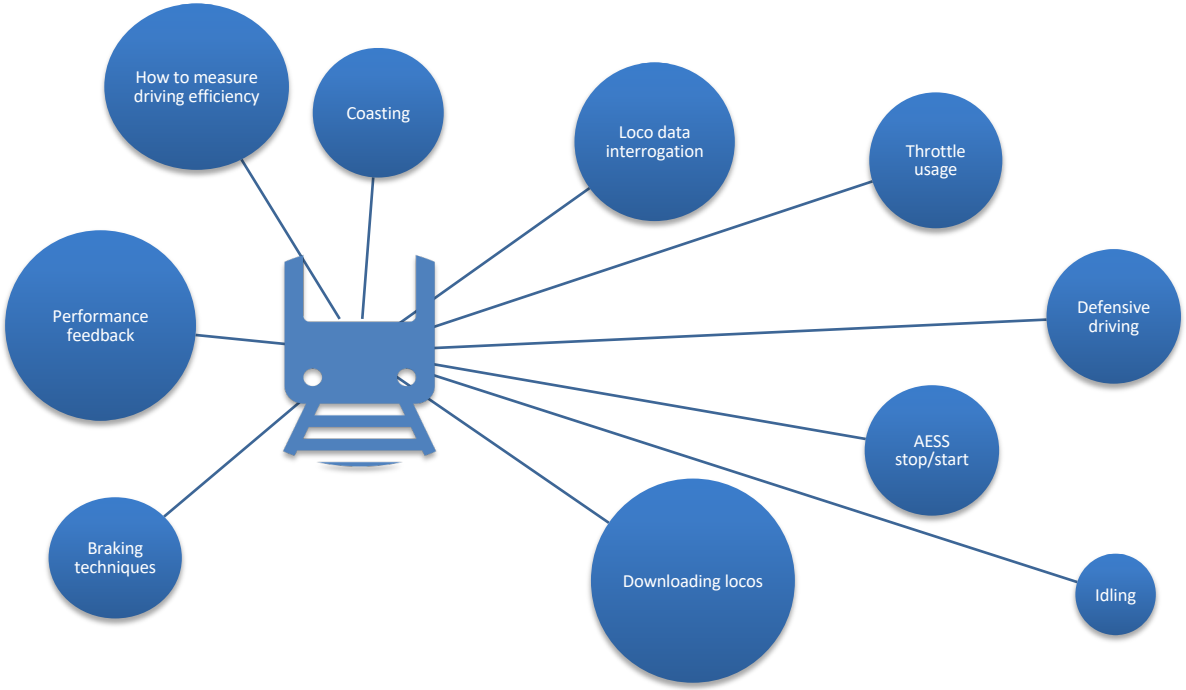
Trains and locomotives driven using higher throttle settings emit more kg CO2e than a train driven using lower settings in conjunction with good technique where coasting is maximised.

This is in part due to the fuel load required to return the train to line speed and the reduced opportunity for the train to use momentum to coast.

The use of notch 8 and notch 7 have been used to highlight driver differences where notch 8 is less fuel efficient and notch 7 is more efficient.

From a sample of 3 routes tested the impact of driver throttle usage and coasting ranged from 1% to 15% reduction in kg CO2e.

Driver Management – Potential SME Innovation Fuel Efficient Driving



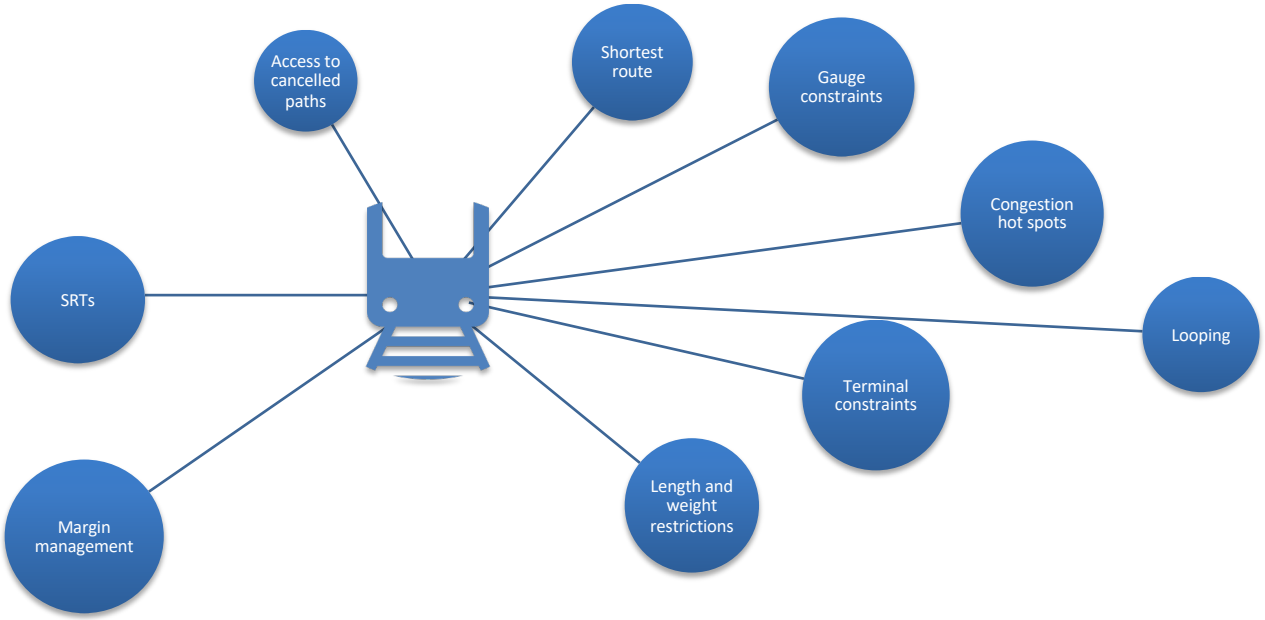
Problem Statement: Good Qtron data exists to measure efficient driving, data also exists to capture train running performance. However, data can be difficult to collect from the loco and collate into usable reports capable of matching driving data to train running data in a format that can be fed back.

Introduction to Path Improvements

Regulation
Trains regulated at loops and signals emit more kg CO2e than a train on a clear run. This is in part due to shorter journey times but more significantly the fuel load required to return the train to line speed and the reduced opportunity for the train to use momentum to coast.
From a sample of 3 routes tested the impact of regulation versus a clear run saw up to 8% reduction in kg CO2e.

Pathing
Trains diverted over longer routes emit more kg CO2e due to the train spending more time under power. From a sample of one train head code with 2 route options 49 versus 65 miles a 33% kg CO2e reduction was recorded.

Path Improvements – SME Innovation to Maximize access to fuel efficient paths



Problem Statement: Data to analyse the efficiency of paths vis a vis fuel efficiency is not currently available. In addition, dynamic train pathing is not available to show what unused paths can be utilised to reduce journey times or distances. Instead, paths are assigned to trains in the WTT with little scope to vary at short notice. In the absence of data analytics, finding new paths is a manual exercise processed through path bidding .

Decarbonisation (Terminal Management)

A Rail Terminal Can Take Many Different Shapes

From sizeable intermodal operations

To local ballast operations

To other loading operations such as cement / petroleum etc.

Decarbonisation (Terminal Management)

A High Number of these Terminals are Located in Residential Areas

Decarbonisation (Terminal Management)

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Thoughts of Decarbonisation Can Come in Many Different Forms

Optimisation through digitalisation

- Less Shunt Movements
- Optimised loading through control and or software
- Optimised Train Consisting through control and or software
- Shunt Loco Emissions Control.
- Alternative Shunt Solutions

Asset Management

Clean loading solutions

Clean Shunting Solutions

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Decarbonisation (Terminal Management)

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THE BRIEF

To Receive innovations and or solutions that either optimise operations or changes in working practices and machinery therefore, creating decarbonisation

got an idea

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Process, Next Steps and Indicative Timetable

	Key Dates
Launch event	Today!
Feedback from participating SMEs re potential areas of interest and any questions	27 Oct
Responses to queries raised by SMEs	4 Nov
Initial collaborations identified – short written submission of project	4 Dec
Selection of initial projects for Dragons Den	18 Dec
Initial Dragons Den – date tbc	12/13 Jan
Selection of initial projects to pursue	End Jan
Ongoing project support / light touch review (RFM)	monthly
Clarifications, 'matchmaking'	ongoing

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