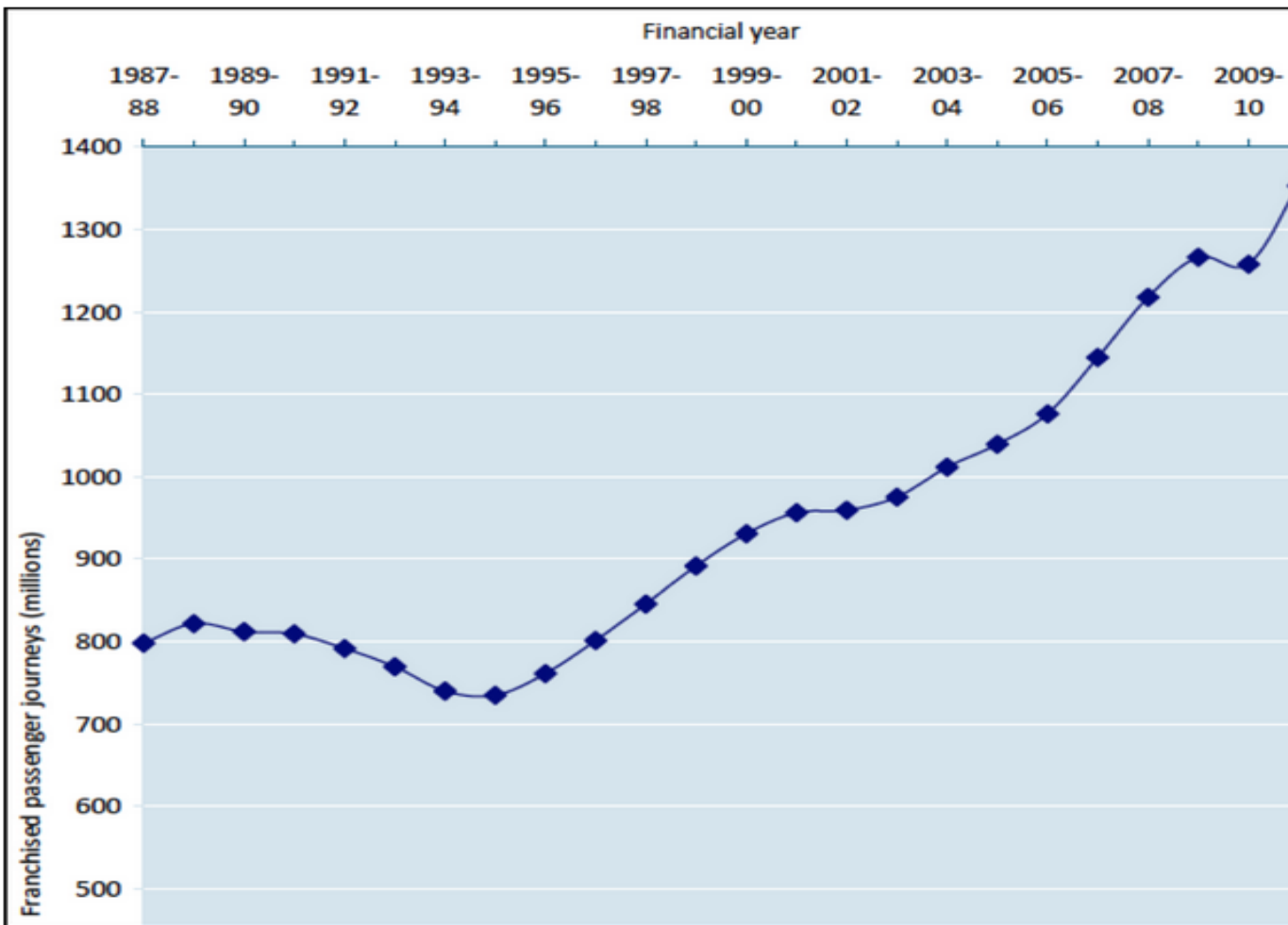# Infrastructure Optimisation of 24/7 Railway

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Motivation

- Increasing level of traffic in the UK railway.

www.railway-technical.com

- The 4Cs: **Customer**, **Capacity**, **Cost**, Carbon

- There is an evident need for the network to be utilised **24/7** possibly with more freight transported at night.

Aims

Move towards a **24/7 Railway**

Introduce a new concept for
REDUNDANCY
- maximise the pre-existing opportunities for redundancy which are currently not fully exploited
- improving flexibility

Produce a methodology to optimise the railway design and operation to achieve a specified level of performance at the minimum cost.

The proposed approach

A 24/7Railway will require a completely **new and integrated approach to operation, maintenance and design to optimise the system as a whole.**

Infrastructure Design

Optimisation

Maintenance   Operation

Constraints:
- Costs
- Current layout
- Gauge

Options for redundancy

- Proper distribution of points over the network

- allow trains travelling in both directions (up/down lines).

- maintain the slow lines to the same standard as the fast lines.

Objectives

- Develop a traffic flow model to use for the system performance prediction.

- Produce a railway reliability model to predict the line performance under the current operating conditions.

- Identify the practical possibilities for including duplication in the system and expand the reliability and traffic flow models to incorporate these options.
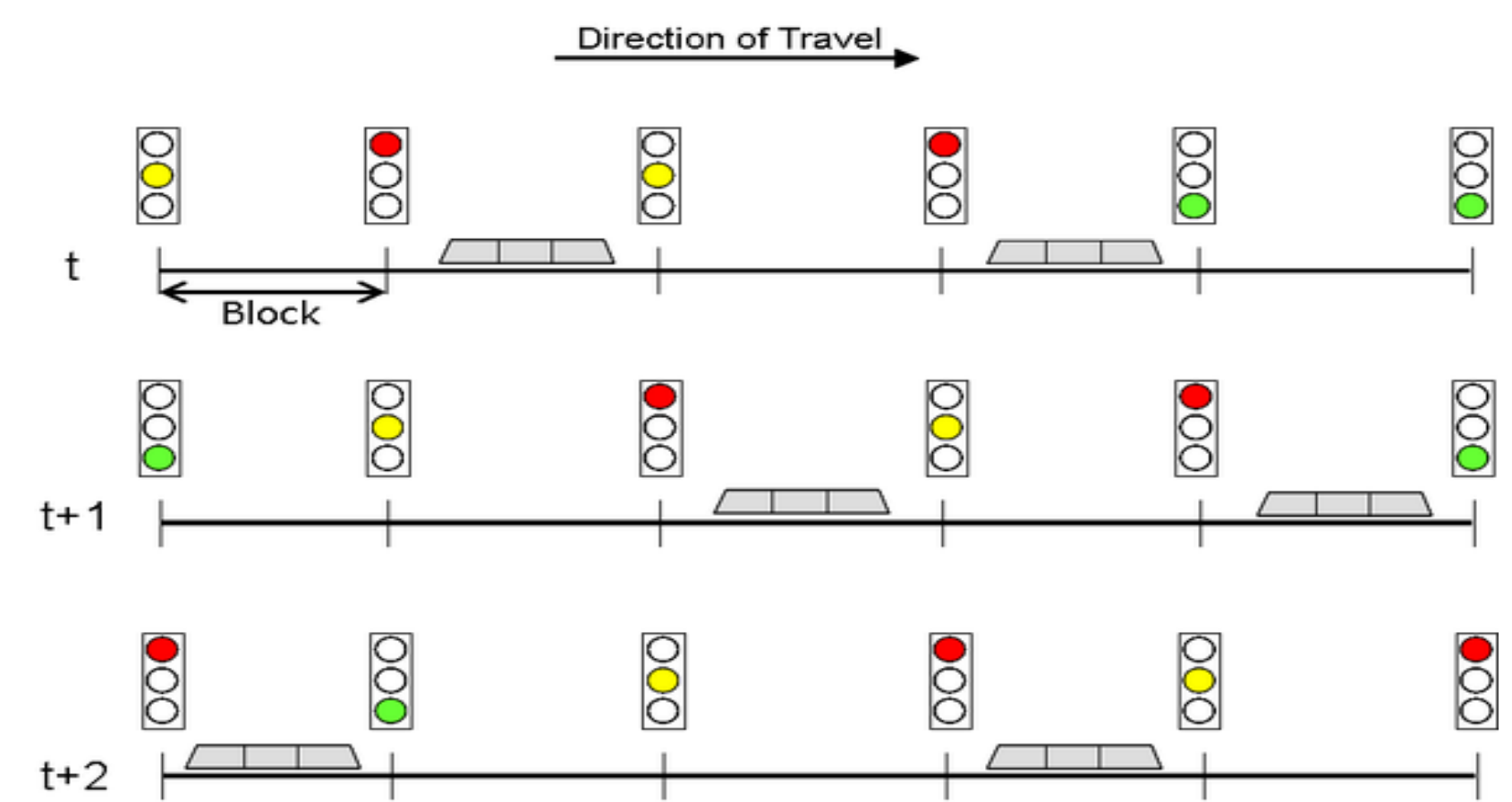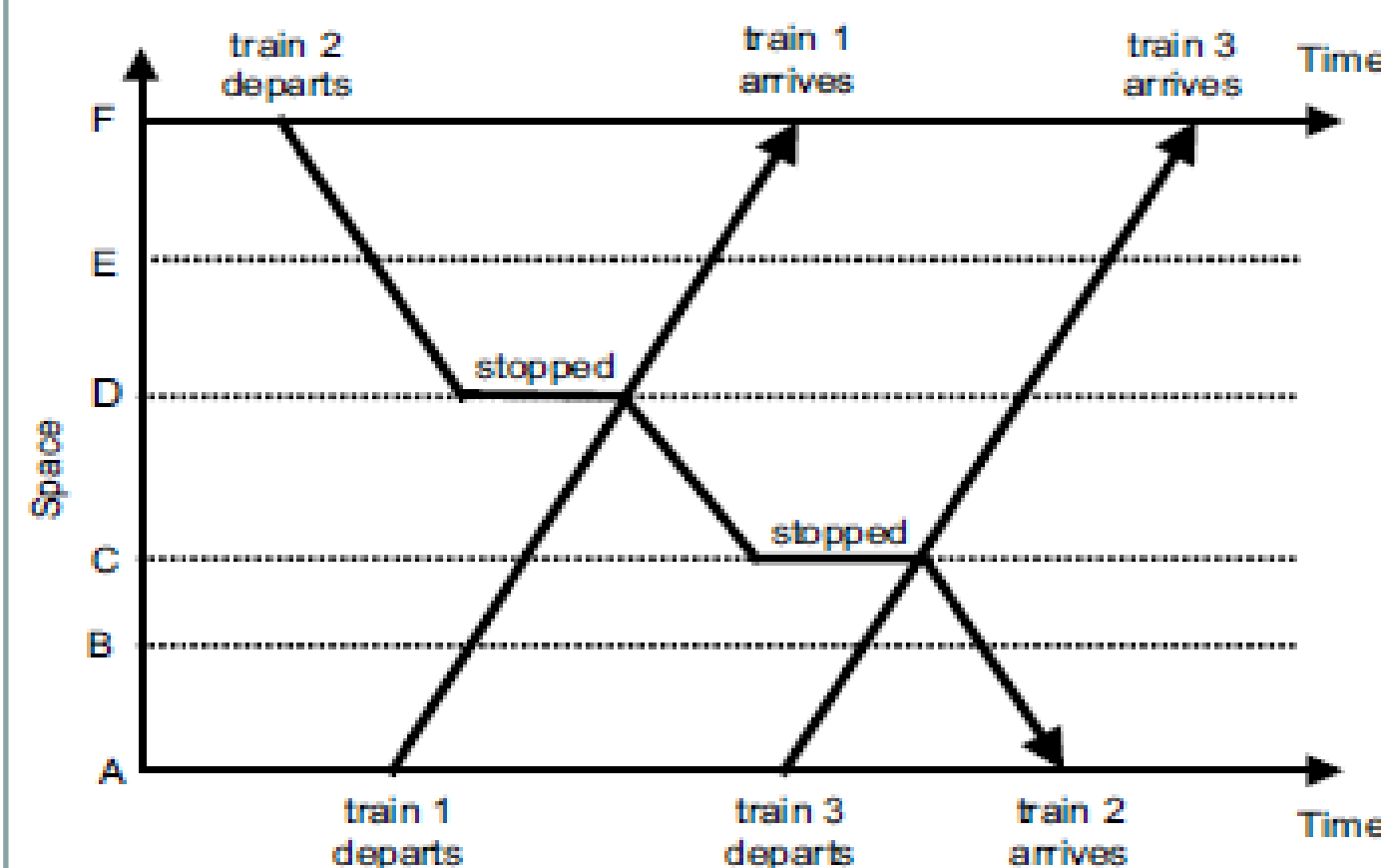
Proposed methodology: 1st step

A discrete-event simulation model is being developed to evaluate the system performance.

-INFRASTRUCTURE
-TIMETABLE
-TRAIN
-FAILURES

→ DISCRETE-EVENT SIMULATION MODEL →

-SYSTEM PERFORMANCES
-SYSTEM STATE

Further Developments

- Practical possibilities for redundancy will be analysed in detail.
- A simulation-based optimisation technique will be developed to identify the best infrastructure configuration.
- Failures and corresponding maintenance strategies will be considered and implemented.