Serco is a leading provider of Asset Management services to the Rail Sector. Our team supports Network Rail in developing robust track asset maintenance and renewal strategies to make better decisions on targeting asset interventions.

Serco developed a bespoke decision-support software tool, Track Strategic Planning Application (T-SPA) for Network Rail. T-SPA has the capability to predict the impact of different options for renewal, maintenance and train service on the condition and performance of the track.

The model is used as a strategic planning tool for investment planning and can be developed to provide an increasingly tactical capability. Ultimately to support decisions on specific replacement plans with the capability to predict investment and maintenance levels to achieve a specified level of track performance.

The project takes advantage of our experience in the development of strategic planning tools, in both the Rail and non-Rail sectors. We provide support in specifying data requirements and managing the collection of quality-assured data (e.g. asset register, track quality and condition, traffic and vehicle data, and renewal/maintenance unit costs) from Network Rail’s corporate asset database for input to the T-SPA.

The object-orientated design method employed enables evolutionary development and improvements in functionality; such as extending the coverage of Network Rail’s network, the accommodation of improved asset data and refinements in the model algorithms (e.g. degradation algorithms). This enables new asset types (e.g. wheelsets or overhead lines) to be added with relative ease and integrated in a structured manner.

The scope of the software includes:

- A scenario facility for renewal, maintenance and utilisation
- A facility for the prediction of residual lives
- The prediction of track quality and number of defects and broken rails
- The prediction of maintenance volumes (related to track condition)
- Determination of business outputs for a given level of investment, allowing prioritisation of replacements according to user specified parameters
- Prediction of renewal costs, derived from given unit costs
- Application to the entire GB railways network
- A method of grouping renewal and maintenance activities.
Network Rail can make the link between predicted track condition and service life, as opposed to the traditional approach of age-based or tonnage-based service life.

T-SPA is continually updated in support of Network Rail’s asset management development programme and as part of the wider industry research managed by RSSB related to the Vehicle Track Interaction Strategic Model (VTISM), of which T-SPA is a key module.

Recent improvements have included:

- Modelling of additional renewal and maintenance interventions
  - Plain-line and Switches and Crossings refurbishment
  - Formation and drainage, including wet bed removal and embankment stabilisation (specified as pre-scheduled work) and formation treatment (specified as part of a renewal activity)
  - Rail defect repair and inspection
  - Enhanced Switches and Crossings tamping and stoneblowing
  - Increased flexibility to model different track/rail type properties
- User-friendly renewal and maintenance criteria expression builder
- Updated track asset data and unit costs
- Flexible modelling of vertical defect rates that can be driven by different rail types with different engineering properties.

T-SPA scenarios can be analysed in minutes compared with previous approaches, which often involved many hours of intensive computation. Network Rail is able to make the link between predicted track condition and service life, as opposed to the traditional approach of age-based or tonnage-based service life estimates. T-SPA is used to support ongoing regulatory reviews of track investment. In conjunction with a new batch processing function, more powerful and flexible analysis can be undertaken, for example, sensitivity analysis of a range of vehicle and track parameters and the use of larger and representative route/track samples.