Beslissingsondersteuning voor instandhouding van railinfrastructuur vanuit prestatie oogpunt

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This document deals with railway maintenance from a system's point of view. ARCADIS, the current owner of the railway maintenance decision support system Ecotrack, wants to adjust the functionalities of this software programme. This adjustment is needed to meet the current demands towards railway maintenance management in order to be competitive in with other transport modes. This need has been the incentive for the development of a decision support model, which looks at the railway infrastructure from a multidisciplinary performance point of view, instead of a monodisciplinary, technical perspective. This approach generates financial benefits for railway maintenance management.

In order to be competitive with other modes of transport, the demand to improve the quality of railways increases. The combination with higher speed, higher axle loads and higher track occupation means that the demand of railway maintenance becomes more onerous. Due to higher track occupation less time is available for maintenance and renewal of the infrastructure. This process puts extra weight on the inframanager's choice for a maintenance strategy. Where the inframanager could focus on the technical condition of the tracks in the past, he now has to look at the performance level of the complete infrastructure: availability of railways for railway traffic.

Ecotrack has been developed to support the inframanager's decisions. Based on the actual condition of the infrastructure, monitored by inspection en detection systems, Ecotrack generates a maintenance and renewal plan for plain track with forthcoming costs of the maintenance and renewal activities.
When the functionalities of Ecotrack are compared with the current performance demands towards railway maintenance management, the scope of the software programme lacks in two directions:

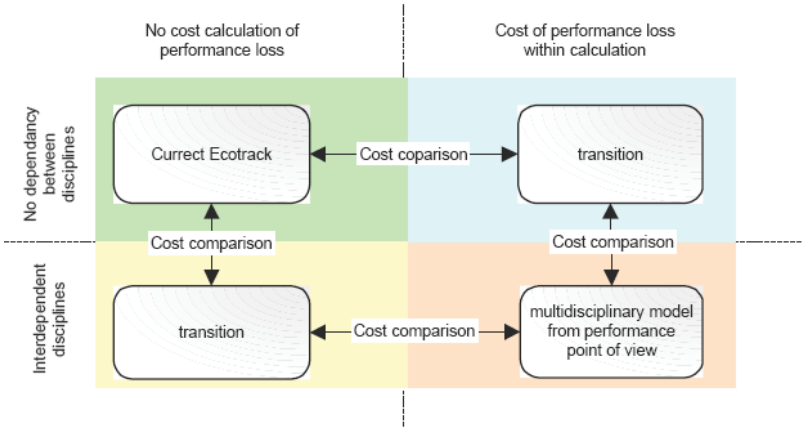
- Ecotrack generates its output solely on the technical condition of tracks and doesn't look at the performance of the rail transportation system. This means that Ecotrack supports decisions are based on suboptimal grounds.
- Ecotrack looks from a monodisciplinary point of view toward a part of the complete setup of railway infrastructure. The programme doesn't reckon with influences due to interactions with other disciplines operating within the infrastructure system. On this topic Ecotrack's decisions are based on suboptimal grounds as well.

By analysing the railway infrastructure as a system from both a functional perspective as from an asset perspective, the interactions between the disciplines can be given within a matrix.

These interactions can be divided into functional-, geometrical-, maintenance consequence- and occupational relationships. In relation towards maintenance management, these interactions influence the choice for maintenance intervals. Performance can be expressed as time in which the infrastructure is available for operation services and can be quantified by calculating the societal costs when trains don't run.

When these interactions and non-performance costs are applied to maintenance planning, the functional layout of the decision support system changes. The system doesn't solely take plain track assets into account, but also looks at all assets within the railway infrastructure, like catenary, switches and crossings et cetera. The balance whether activities are executed simultaneously or separately is now based on minimising the costs for carrying out the activities *and* societal costs due to the lack of rail traffic during maintenance activities. This methodology looks at railway maintenance from a system's point of view and puts performance aspects into one common denominator.

In order to define the impact of interactions and performance aspects, Ecotrack's maintenance plan is compared with the maintenance plan of the new model through a case study of a Dutch railway section. Due to the fact that Ecotrack isn't directly comparable with the new model, transitional comparisons have to be made. With the aid of these transitional steps, interaction effects and performance effects can be analysed through cost comparisons.



By running this framework on a Dutch railway section, the sub optimisations are shown. In this case the total costs of a maintenance planning, dealing with performance demands, are reduced around ten percent when a multidisciplinary perspective is taken instead of a monodisciplinary one.

This methodology gives Ecotrack the possibility to support future maintenance decisions based on measured condition of the infrastructure. In this case Ecotrack will not solely look at the technical condition of plain track but will account the technical condition as a part of the functional demand towards railway infrastructure: availability of this infrastructure for transporting goods. Due to shifting relations between organisations within the railway transportation system a sensible step will be to evolve the current Ecotrack, by means of accounting relations between maintenance activities and availability affection, towards a multidisciplinary, performance aimed software programme.

By doing so, railway maintenance management keeps up with management of other types of infrastructure, and the railway manager can
clearly show its maintenance strategy forwards the functioning of the infrastructure within
the transportation system. This development meets the demands of the customers of railway
infrastructure given in existing and nearby future performance contracts.