



IMPROVE THE SAFETY OF RAILWAY NETWORKS

INFRABEL CASE STUDY

CUSTOMER

Infrabel is the operator of the Belgian rail infrastructure. It builds, owns, maintains and upgrades the Belgian railway network, makes its capacity available to railway companies, and ensures to create optimum opportunities for train traffic. The central location of Infrabel’s railway network within Europe offers plenty of opportunities for the socio-economic development of Belgium. Infrabel makes good use of these opportunities and through numerous projects, continues to turn the Belgian railways into an indispensable means of transportation. The company employs over 12,000 people and has revenues of 1.4 billion euros.

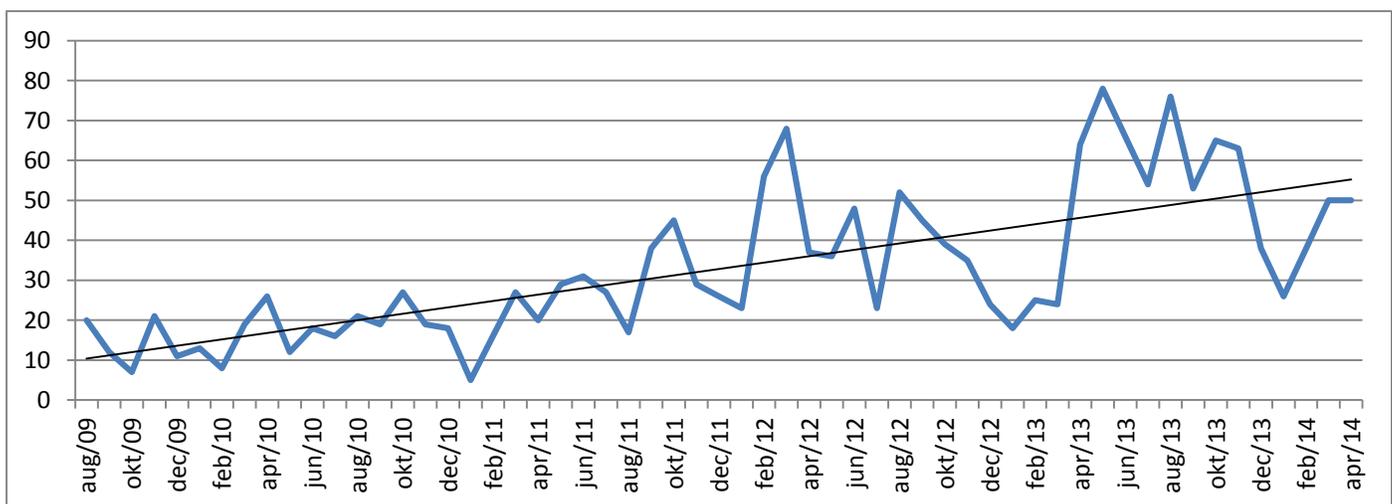
THE CHALLENGE

Infrabel’s core business consists in operating and developing a performant and safe railway infrastructure. In order to support its business, Infrabel has deployed a pervasive telecommunications network, including a fiber optic transmission network of over 7000 route kilometres. This fiber optic network undergoes significant change and expansion, which created a key challenge for Infrabel’s ICT organization.

Belgium occupies a central place within Europe and the Belgian railway infrastructure is used by many passenger and freight operating companies. Infrabel’s customer demand compliance with the highest safety standards and Infrabel strives to become one of Europe’s top 3 companies with respect to railway safety. In order to reach this goal, it has engaged in range of safety initiatives, including the deployment of the European Train Control System (ETCS). In order to reach ECTS level 2, Infrabel is deploying a pervasive GSM-R network for communications between the trains and the ECTS trackside equipment. Infrabel serves the GSM-R trackside antennas with its fiber optic network and each connection needs to be highly reliable and redundant.

In addition, the railway network experiences significant construction works, especially in the metropolitan area of Brussels, because of strong growth in railway passenger traffic. Those works also lead to expansion of the fiber optic network and trigger additional maintenance events. And last but not least, adapted internal communication procedures and awareness augmented the transparency of all planned maintenance activities on the fiber and transmission network.

The combination of those 3 factors has led to a 3 fold increase of planned maintenance analysis over the last 4 years, as shown in the figure below.



Infrabel's telecommunications network is designed for high reliability. Maintenance on the fiber optic network shall not lead to any interruption of the communications services, especially with the trains. Loss of communications with the trains might force the latter to significantly reduce their travel speed, causing thereby a major disruption in Infrabel's core business. However Infrabel's telecommunications network has undergone significant changes by itself, including the introduction of new technologies and new suppliers. It is becoming increasingly difficult to ascertain that each previous design is still complying with the goal of high reliability and high survivability. It has therefore become increasingly complex to reliably assess, within a reasonable time frame, the exact consequences of a planned maintenance event.

Those maintenance events do not only impact Infrabel's own communications and signalling network. Infrabel (through a wholly owned subsidiary) is also offering connectivity services to the commercial market, in particular large corporates and other licensed operators. It offers stringent SLAs to its customers and needs to ensure that the planned maintenance events do not violate those SLAs.

NETWORKMINING'S APPROACH

NetworkMining's solution to the problem involves correlation between master data from several sources, namely several transmission network management systems and Infrabel's proprietary optical cable database system. In the first step NetworkMining federated the relevant data from the various systems into its software. In order to ensure high data quality, NetworkMining's software updates the data every night. This enables changes in the master data to flow through to NetworkMining's software in near-real time.

Secondly the solution requires simulation of the impact of each event. NetworkMining deployed its incident simulation application, which enables multi-layer and multi-vendor simulation of transmission network failures. It includes simulation of the actual protection switching mechanisms deployed in the network. For each event, it provides the detailed list of the impacted services and customers.

Infrabel analyses the results further with the goal to minimize the impacts. It will also validate the unavoidable impacts with its customers (e.g. for unprotected services).

OUTCOMES & BENEFITS

NetworkMining's solution enabled Infrabel to speed up the processing of each planned maintenance event by 50%. Infrabel could keep the operations team at its current size while coping with the additional workload created by the continuous increase of planned maintenance events.

Patrick Roose, team leader at I-ICT Back Office Infrastructure & Solutions, says: "Knowing the impact of an interruption gives you control over your network. This is extremely important for operational services in the more and more complex environments we work in. I can't imagine that an operator has to work 2 days to manually identify the exact impact of a fiber cut. However with CWDM + DWDM + SDH, a cable can transport more than 200 connections. Network Mining helped us to deal very effectively with this problem."

The quality of the planned maintenance preparations has also improved. The number of fall-outs i.e. the number of planned maintenance events leading to unexpected service interruptions was greatly reduced. Most of them could be traced to data quality issues in 2 systems that were used as master data repositories. The issues are corrected as they are detected. This new process has become a part of Infrabel's ISO compliance processes. NetworkMining's solution has therefore also contributed to the quality improvement of the master data.