

ORBIS – Network Rail’s Offering Rail Better Information Services



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Introduction

ORBIS, a £330 million seven-year programme to create a detailed digital model of the UK’s rail network, is one of Europe’s largest rail infrastructure digital transformation programmes. Launched in 2012, the programme aims to digitise maintenance of the UK’s railway infrastructure to help Network Rail manage assets more efficiently, cost-effectively and safely and is predicted to save up to £1 billion over the next decade. Through the introduction of mobile apps and tools specifically designed to capture high quality asset data and new ways of viewing the railway, ORBIS aims to deliver the resources needed to meet these aspirations.

Motivation

More than 1.6 billion passengers now travel by train every year, a number expected to grow by another 30% over the next 20 years. Network Rail must modernise the rail infrastructure, increase capacity and improve performance. This challenge needs to be balanced against reduced running costs.

In February 2011, the ORBIS team produced an Asset Information Strategy for Network Rail based on a detailed understanding of the business needs. ORBIS is an ‘asset data to intelligence’ programme that is designed to collect, join and exploit accurate asset data on the rail infrastructure. This change was critical for a company that was too reliant on outdated, often paper based processes to capture data. Getting insight into data was challenging as data was often siloed in disparate systems located in different parts of the business.

Development

The programme falls into three broad areas:

- tools to capture, access and maintain high quality data
- the ability to join and view asset data in collaborative work environments
- decision support tools for managing the infrastructure assets.

The first step was to give all of the frontline teams iPads and iPhones, about 13,000 in total. They were encouraged to familiarise themselves with these tools and come back in six months to explain what they would like to do with them. The teams returned with ideas that were taken on by the delivery units, resulting in the creation of apps tailored to their users.

An ‘information stack’ has been created containing data that describes what the assets are, the transactions against them, their condition, topography and topology. Data also describes how assets are used, their capability and performance.

Over time, the capability to improve the management of fixed assets will be developed, based on an interoperable spatial model of the railway that embraces the complexity of the system and allows its behaviour to be explained. This will enable a complete shift in the type of asset management policy that is possible, to one where the interfaces between different parts of the system can be managed and the capabilities that the assets offer enhanced. For example, at a level crossing, the rail system interfaces with the highway system, and comprises signalling, telecoms, track, off track, drainage and electrification. An asset management policy that can address the complexity of the resulting interactions will be beneficial.

The technology already exists to create a digital railway. However, technology is only a small part of what is required to deliver the vision. An outcome-driven business change programme is crucial to the success of the project, requiring a change in the culture of the organisation that allows the new capability to be embedded.

Results

Using a ‘Model Office’ approach, ORBIS has rolled out a number of transformational projects across Network Rail’s eight routes. A ‘Model Office’ approach means that it was developed through direct involvement and interaction with end-users from the initial design to the finished product. This ensures the people who would be using the app were part of the design and building of the solution and meant the development was driven by a ‘pull’ from the business rather than a ‘push’ from the programme.

Outcomes include:

- **Linear Asset Decision Support tool (LADS):** Using iDevices or desktops, engineers visualise, manipulate and analyse information about track data from one source. This enables proactive maintenance management through a better understanding of the assets. LADS consolidate more than 32,000km of track asset data into a single format.
- **Apps for iDevices:** A raft of intelligent apps have been delivered to end-users, including the My Work, Fault Code Lookup and Close Call apps. These are explained in the pop-up box.
- **Rail Infrastructure Network Model (RINM):** Using data from a range of sources, including images from existing

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master assets and aerial surveys, RINM delivers a clear picture of the entire railway network and how it relates to the wider environment.

- **National Aerial Survey:** The first complete aerial survey of the entire

16,000 kilometres of the UK’s rail network was carried out in 2014, capturing images of terrain to a much great level of detail than existed previously.

Applications

My Work app:

My Work was designed to digitise the Ellipse (Network Rail’s asset database) work order management process. By delivering accurate, up-to-date information to iDevices, when and where it is needed, it eliminates the need for paperwork and supports mobile working. The app allows maintenance teams to view and close work orders and raise work-arising identification forms (WAIFS) on site, improving their ability to plan and organise their work schedules. The app includes access to the work bank and allows teams to view the condition history of an asset to enable more informed decisions on maintenance work. It also enhances visibility of other work in the vicinity of a maintenance team. Using the app, engineers can capture asset data as part of their day job and deliver completed, accurate work orders to section managers for review and approval.

To date, more than 3.5 million work orders have been closed on the My Work app.

Fault Code Lookup (FCL) app:

FCL is a mobile application used by technicians and fault teams to capture the most up-to-date information on faults and failures. The information is then delivered to incident controllers and the fault management system (FMS) in real time. Fault teams can carry out fault analysis and send accurate cause and supporting information directly to incident control.

FCL was first rolled out in June 2014 and is now used by approximately 5,000 users.

Close Call app:

Close Call was introduced to increase safety across Network Rail. Maintenance teams use the *Close Call* app to efficiently capture data about hazardous situations, so they can report information in real time and ensure repairs are immediately addressed.

Next steps

In the next five to 10 years, Network Rail would like to move away from a focus on assets to a focus on their function. For example, instead of a track policy, there could be a policy for line speed, weight bearing capability or traction capability. This could allow train performance to be linked to the physical condition of the infrastructure, for example. The ability to view assets in a different way will be enabled by data.