

THE DIGITAL TRAIN

A NEW APPROACH TO MAINTENANCE



Digital train case study: CP Pendolino set No 4001 passes Entroncamento on 4 February 2011 with the 15.47 Porto - Lisbon Alfa Pendular service. **KEITH FENDER**

Adoption of the digital train approach can revolutionise train maintenance, Nomad Digital's commercial director Jay Saw told the Golden Spanners conference.

To set the context, Mr Saw pointed out that the current budget for train maintenance in the UK is £2 billion. The McNulty report set a target to cut costs by 30%, and Mr Saw stated that significant savings can be achieved in maintenance through the use of ICT and operational technology to create a digital train.

In comparison to the airlines and car industry, the rail industry has been slow to adopt this technology: Nomad believes that only 10% of trains across the world are truly connected. But while the Digital Railway programme has at last brought this thinking to bear, too many operators add digital systems in a piecemeal way and one-third of systems experts are

expected to leave their company through retirement within 10 years, creating an impending brain drain on their legacy systems.

For Nomad, the key to a fully networked, fully connected train is to start by understanding what information you can get out of it - having a blueprint in mind at the outset is vital. Norwegian operator NSB and others on the continent have this vision, so why is it difficult for the UK to accept it, challenged Mr Saw.

CONDITION-BASED MAINTENANCE

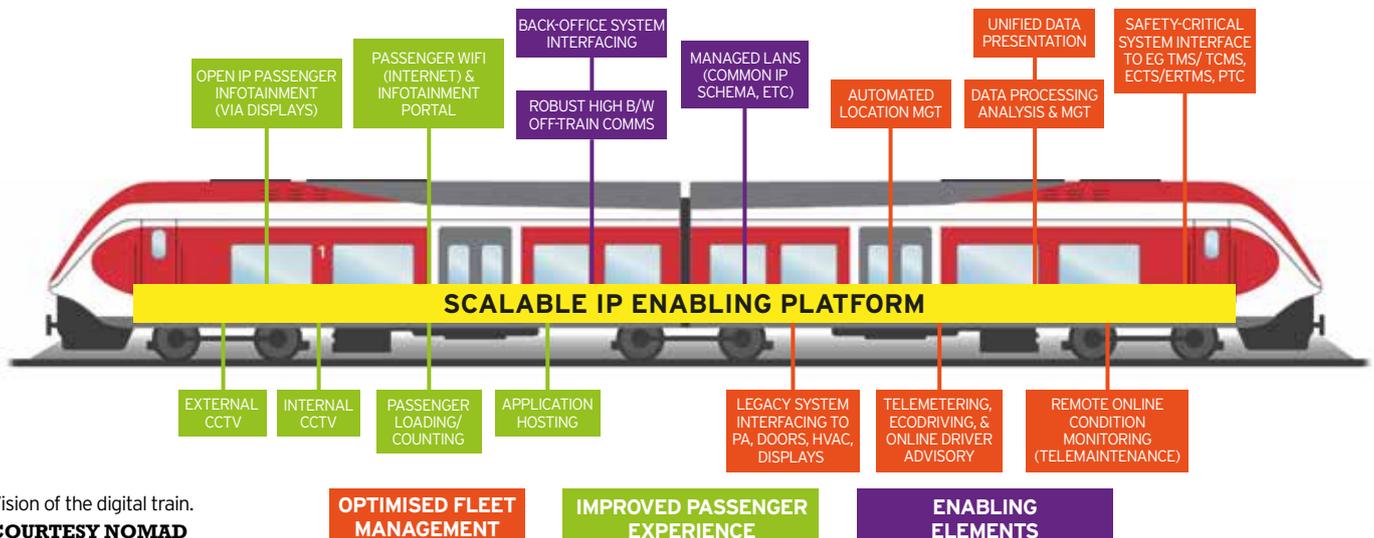
The aim of the digital train concept is to give a single maintainer-friendly view of the train. True digitisation involves real time alerts when failures happen, the ability to predict failures and to highlight hidden issues. By using information in a more controlled way to plan corrective maintenance, engineers can

move towards a condition-based maintenance philosophy, helping to maximise equipment life, increase availability and reliability and reduce cost. The key is to identify potential failure points before a failure occurs, as the repair cost is usually far lower if this is the case, and to do this warning signs need to be identified.

But trains provide a huge amount of data - a standard EMU gives about 5,000 signals, equivalent to 2GB of data per train per day, and gathering this data is costly - data transmission could cost around £2,000 per train per annum. Nomad believes that about 0.25% of this data is critical from a maintenance perspective, and so the secret is smart use of it. This requires the ability to access this data, process it and then have an on-shore back office solution which can visualise and analyse it, develop predictive algorithms

and integrate procedures into maintenance management. Data can then be compared to understand how fleets are performing relative to each other and, if presented in a standardised form, allow for direct comparisons across manufacturers.

To demonstrate the concept's success, Jay Saw highlighted the application to the Portuguese Pendolino fleet, for which 70% of maintenance tasks are now carried out on the basis of condition in a more controlled and managed environment. This has helped reduce in-service failures by 43%, increase availability by 20%, raise average fleet mileage by one-third and reduce instances of 'no fault found' by 40%. Over a 12-year period, maintenance costs have fallen by 57%, demonstrating the significant room for improvement that the digital train concept offers. [inf](#)



Vision of the digital train. **COURTESY NOMAD**