

# WI-FI TELEMETRY

in Railway Sector with Pentaho



## THE COMPANY

Nomad Digital is a company based in Newcastle, England, which provides wireless connectivity solutions to the railway industry.

Founded in 2002, Nomad Digital has more than 80 clients from around the globe, having presence in countries such as Germany, France, Portugal, Italy, the USA, Canada and Australia, ensuring the overall control of operations in all continents.

Nomad's main company principle is to guarantee excellent customer experience while, maintaining the security and operational efficiency of its connections. It is noted in the market for continuously seeking out innovative projects in connectivity, WiFi products and services, passenger information systems (PIS) and on board entertainment platforms.

## THE CHALLENGE

The networked train produces a great deal of data relating to multiple subjects such as telemetry, routes, passengers and WiFi usage.

With the evolution of the digital train and in taking connectivity even further – reaching train builders, maintainers and on board staff – even more data will be generated. This data is of high value, particularly when cross-referenced.

The challenge was to integrate all the data produced by the different systems into a single data warehouse with historical information, providing a centralised view. The ultimate goal was to enable an additional analytics service to customers and at the same time allow better monitoring of SLAs and other contract terms.

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This data had to be integrated, but it was also necessary to have the correct business rules applied to convert it into relevant information that could easily be cross-referenced. Nomad Digital has as customers some of the biggest railway operators and thus data volumes and performance were also concerns.

At the same time each customer has its own specific requirements, making the environments quite heterogenous.

## THE SOLUTION

Xpand IT's mission was to **implement an analytics product** that made it possible to create **specific analyses** with a set of available **key performance** indicators, with **hardware** and **software scaled** to the requirements at hand and easily extensible well beyond the first implementation. This product is used both internally and by some of Nomad's customers.

The product is a Business Intelligence application that has been deployed mainly in the cloud to give the extra flexibility and scalability:

- Data is initially retrieved from multiple systems (data generated onboard trains) through Nomad Digital's communication unit (CCU). The CCU collects telemetry data and sorts it into relevant modules depending on data type. It then feeds the data from the modules to their corresponding shore-side applications and servers. Since each customer has a specific infrastructure, data lakes were implemented using multiple technologies such as Mongo DB or Google Big Query
- Pentaho Data Integration is used to collect and transform the data from multiple Nomad systems and the data lakes. This involves not only dealing with heterogenous environments in terms of source systems but also applying complex business rules. Due to the amount of data associated with some customers, it was necessary to use both standard databases and a MariaDB ColumnStore to improve performance
- Multiple OLAP cubes were implemented allowing users to explore the data but also to support the necessary reports and dashboards implemented with the Pentaho BA Suite

Due to the fact that the solution is deployed in the cloud, specific steps were implemented on Pentaho Data Integration to improve management and simplify some processes – for instance the creation of snapshots for backup.

## TECHNOLOGIES

### PENTAHO DATA INTEGRATION

Pentaho Data Integration is an enterprise platform ETL tool to accelerate data pipelines; it provides visual tools to reduce complexity and increase productivity. It has a graphical user interface making it easy to use and has the power to integrate all data types, which includes not only traditional technologies but also a very strong emphasis on big data. This makes it the perfect tool for complex ETL projects.

### PENTAHO BUSINESS ANALYTICS

Pentaho Business Analytics enables data analysis across multiple dimensions and provides interactive visual analysis and intuitive web-based reporting tools, empowering business users to take information-driven decisions that positively impact their organisation's performance. Together with Pentaho Data Integration, it is a complete end-to-end solution for business intelligence providing power for technologists and rapid insight for users.

### MARIADB COLUMNSTORE

MariaDB ColumnStore is a storage engine optimised for modern analytical workloads – distributed and with parallel query processing for greater scalability, and columnar storage for higher efficiency and query performance. MariaDB AX extends MariaDB Server with MariaDB ColumnStore, data adapters and tools to create an enterprise open source solution for modern analytics and data warehousing.

## BENEFITS

Application of complex business rules such as placing journeys in timezones or determining crossing times at passing points, allowing further enrichment of analysis by cross referencing information

Simplification of monitoring Service Level Agreements by making all information available on a single platform that also allows ad-hoc exploration

Cost optimisation based on detailed monitoring and identification of patterns of data usage on board trains

Simplified communication with customers by scheduling pre-built reports which are automatically sent by email

Cloud integration to simplify maintenance and improve flexibility around resources

Broader perspective on KPI analyses



Nomad have formed a very strong bond with Xpand IT, ensuring all customers are able to move forward, and continue to grow and develop their strategies. Their knowledge of Nomad's products and infrastructure have allowed us to offer progressive, forward-thinking solutions, whilst always favouring innovation.

Nomad Digital