High-speed trainline monitoring and predictive maintenance

Anomaly detection – IoT – Artificial Intelligence

CONTEXT

Vinci, through its subsidiaries Mesea-Lisea, has obtained in 2010 the concession for the LGV line operation (High Speed Line between Tours and Bordeaux, France). The achievement of contractual commitments with railway operators (SNCF today, other potential actors in the future) requires fine infrastructure management and the processing of large volumes of data. This high-stake service level concession comes with high penalties, and therefore, the incidents management and their number have a big impact on the railway operations' profitability.

As a long-time maintenance and material management expert, it was also critical for the company to accelerate its digital transformation and reinvent the management of its digital assets to be able to focus on its core business: railway infrastructure.

VINCI is a French concessions and construction company founded in 1899, counting over 211,233 people. Operating in 116 countries worldwide, it is the largest construction company in the world by revenue (€43,5 billion in 2018 . Its main areas of activity are building, infrastructure and facilities management with Vinci Autoroutes, Vinci Concessions, Vinci Énergies, Eurovia and Vinci Construction.

CHALLENGE

- **Aggregate various data sources**

Stakes are multiple: counting and identifying trains, infrastructures availability, responsibilities sharing when an issue arise (rail incident or disabled train), maintenance plan optimization by detecting weak early signals.

To be as simple and efficient as possible, the solution had to integrate more than 20 data sources, including:

- Data coming from communication between SNCF control center and trains
- IoT data
- Meteorological sensors
- Data from the maintenance train controlling various elements of the infrastructure

- **Operationalize data processing**

Although all this information already existed, it was completely fragmented between the different departments. This limited approach did not help to fully leverage and power data or to go further by developing new services based on Artificial Intelligence.

SOLUTION

After a thorough evaluation of different solutions, Vinci chose ForePaaS and its partner Eleven, a consulting firm specialized in strategy and data science, for several reasons:

- Access to all modules required for a data project in one place: collection, storage, exposition, training and run of AI models
- The capability to connect and process multiple data sources and formats, including high-frequency IoT, passive and active data
- An agile collaboration framework with fast iteration cycles and a step-by-step, personalized support

A first demonstrator has been deployed in less than 6 months to better understand the origin of unavailabilities, with a focus on train switches for which data are harder to process. A second phase has been launched in the spring of 2019, focusing now on data extraction and predictive models development to move towards more predictive maintenance.

KEY RESULTS

+ 20 different data sources (internal, IoT, external) collected and processed

- 6 months to build and deploy a 100% operational product