

## **INDRA IMPROVES THE OPERATION AND MAINTENANCE OF HIGH-SPEED RAIL AND ROAD TRAFFIC SYSTEMS WITH BIG DATA AND ARTIFICIAL INTELLIGENCE**

- **The company has rolled out a new module for the integration, analysis and modeling of data in its proprietary control solutions, Mova Traffic, as part of the European R&D+i project "Transforming Transport", in which Indra leads the work of 48 organizations from nine countries**
- **The tests performed in the rail pilot demonstrate that the tool can achieve more efficient predictive maintenance levels, by predicting the degradation of each element of the infrastructure, the likelihood of failure and its severity, while optimizing the operation**
- **The road traffic patterns developed in the pilot on smart roads can be used to predict congestion on a toll road two hours in advance and anticipate the probability of an incident on specific days and times, improve planning and the reaction times**

**Madrid, 6 November, 2018.-** Indra, one of the world's leading technology and consulting companies, has started to roll out a new big data and *machine learning* module in its proprietary road and rail traffic control solutions, which has already demonstrated during the preliminary tests its capacity to improve the operation and maintenance of transport infrastructures.

The tool can be integrated in DaVinci and Horus systems, whose control technology is part of Indra Mova Traffic, which allows comprehensive management and control of multimodal mobility, maximized by the incorporation of technologies such as big data, artificial intelligence or IoT.

The work is part of the Transforming Transport project, which, with a budget of €18.7 million, is one of the largest projects funded by the H2020 program of the European Union and aims to improve mobility in Europe through the use of big data. In addition to leading the Consortium, coordinating the work of 48 partners from nine countries, Indra is leading four of the 13 pilots of the project.

The company is currently responsible for the smart rail maintenance pilot project in Spain, in the high-speed section between Cordoba and Malaga, in collaboration with Adif, Ferrovial Agroman, Thales and CI3. The pilot project has made progress in gathering data associated with the train maintenance and operation activities, topology and weather conditions, with the dynamic inspections revealed as the data sources with the highest "quality", which provide information about the interaction between the train and the track, and the geometric inspections, which provide information about the width of the track, its alignment, deformation and deviation.

Thanks to the integration, analysis and modeling of data, with the use of big data and artificial intelligence, the tool can be used to predict the degradation of each element of the infrastructure (track, interlocks, switches, etc.), the fault probability and their severity. The operator can access all of this information about the assets, maintenance and traffic, as well as how to generate reports and charts. This new information is used in decision-making processes, improving the planning of maintenance activities, facilitating how predictive maintenance is carried out, reducing costs and the degradation of the infrastructure.

In addition to improving maintenance, the team is currently working to incorporate all of this information with the rail operation information through DaVinci, the rail management platform and Indra's TMS system, with the aim of also optimizing the use of the rail infrastructure. The purpose is to have a real-time system that uses the results of the predictive model developed, together with the data of traffic and the planned schedule of trains.

**Smarter roads, thanks to big data**

Indra is also leading the two pilots on smart roads, as part of the Transforming Transport project. The projects are being rolled out on Ausol highway, which connects the cities of Malaga, Estepona and Guadiaro in southern Spain, and on the North Coast highway in Portugal, extending from Oporto to Caminha and Viana do Castelo to Ponte de Lima, with the support of the DGT and in collaboration with Cintra and Ci3.

A big data and artificial intelligence module is being implemented on Horus, Indra's traffic and tunnel management platform, under almost real conditions, with the purpose of managing all data from more than 20 sources (traffic, toll, maintenance, weather, social networks and other types of data), to detect patterns and provide added value information in real time to the traffic control center, which will facilitate decision-making processes. The tool is already showing its potential to optimize the use of infrastructures and of maintenance work, minimizing traffic congestion levels and reducing road accidents.

For example, the traffic prediction models developed can predict bottlenecks at toll stations up to two hours in advance. This can be used to have enough time to react and prevent or mitigate them, transferring more staff to the location or informing drivers about recommended changes in highway access points and exits, in relation to the use of some lanes or means of payment at the toll booth.

In addition, predictive models have been developed to detect road incidents, helping the control center to make decisions faster under extraordinary conditions and when the reaction time is critical. Currently, the models can almost predict the probability of an incident at a specific time, such as in the case of the evening before a vacation in summer or Saturday nights during the month of December. In addition, this information can be shared in real time with the emergency services, improving the safety levels.

**Use of emerging technologies**

The pilot project in Portugal will be a replica of the project rolled out in Malaga, but this project will also make use of the new sources of data provided by emerging intelligent transport systems (ITS), such as distributed acoustic detection (DAS), based on the buried fiber optic systems installed throughout roads, Indra's solution that allows traffic control centers to receive alerts in real time when a vehicle hits a safety barrier.

In addition to Indra's proprietary control solutions, Mova Traffic (DaVinci and Horus), the rail pilot project and smart highway pilot projects will use Onesite Platform (Minsait IoT SOFIA2), this platform with IoT and big data capacities developed by Minsait, an Indra company, with the purpose of integrating, analyzing and comparing data from different sources. Therefore, in addition to offering its solutions and experience in the transport sector, Indra contributes to the project with its digital capabilities.

Indra is also leading the pilot project for the airports included in the Transforming Transport program, which is being tested at the international airport of Athens and which conducted the first demonstration in 2017. A descriptive model of the passenger movements is already available and work is being carried out to improve the prediction capacity associated with their behavior through the analysis of airport shops, as well as estimates of possible delays, missed transfer flights or the resources required to handle passengers arriving at the security areas.

**Impact project**

Transforming Transport responds to the challenge of finding a more efficient and sustainable mobility model through the application of big data to the transport and logistics sectors, which is currently used by only 19% of the companies in the sector. It addresses 13 pilot projects in different transport areas: rail infrastructures, roads, airports, ports, sustainable connected vehicles, integrated urban mobility and logistics.

It is calculated that the use of big data can improve operational efficiency of processes and services linked with transport by at least 15%, optimizing the use of resources and reducing maintenance costs, fuel consumption or incidents, among others. According to the European Commission, the efficiency of mobility is expected to be improved by 10%, which would result in savings of up to €100,000 million. Big data also

offers a more personalized service that is adapted to the needs of customers, improving their satisfaction and creating new revenues or business models.

**At the forefront of the *smart mobility* revolution**

Indra has a unique position in the Transport market, since it combines its knowledge about the business and its proprietary transport technology with the new digital capabilities; and it has developed leading consolidated solutions, with the capacity to incorporate emerging technologies and to adapt to the requirements of different customers.

Indra Mova Solutions, the innovative proposal by Indra to lead the way towards the future of mobility and technology in the transport sector, focuses on the new digital and integration capabilities, specialization and innovation demanded by the market combined with Indra's reliability, business know-how, transportation technology, and the unique experience of its team of professionals.

The new offer for the transportation market has resulted in a portfolio of end-to-end solutions which covers the entire cycle of our clients' transportation projects: from engineering and consulting to the solutions of collection, operation and control (Mova Traffic), security, communications, user experience and aftermarket services.

Indra leads some of the main European innovation initiatives aimed at digitizing transport and the new smart solutions based on IoT, artificial intelligence, big data and cloud computing. In addition to spearheading the Transforming Transport project, Indra is part of the governing body of Shift2rail, the main European research and innovation initiative in the rail transport sector, and also leads the Connective project, which will make it possible to book a trip on different means of transport in Europe with a single click.

Work is being carried out within the framework of the SCOTT and ENACT projects to bring new smart and secure IoT systems to the rail industry through new wireless communications solutions that improve efficiency, security and interoperability. A very good example of Indra's leadership is the AUTOCITS project, which will test autonomous cars on roads in Lisbon, Madrid and Paris to adapt regulations, traffic control centers and infrastructures to the connected, autonomous vehicle.

**About Indra**

Indra is one of the leading global technology and consulting companies and the technological partner for core business operations of its customers world-wide. It is a world-leader in providing proprietary solutions in specific segments in Transport and Defence markets, and the leading firm in Digital Transformation Consultancy and Information Technologies in Spain and Latin America through its affiliate Minsait. Its business model is based on a comprehensive range of proprietary products, with a high-value focus and with a high innovation component. In the 2017 financial year, Indra achieved revenue of €3.011 billion, with 40,000 employees, a local presence in 46 countries and business operations in over 140 countries.