TRANSFORMING TRANSPORT

PRESS RELEASE

TransformingTransport - first Pilots' results

Technology is transforming transport as we know it in more ways than one. The gathering and analysis of Big Data has the potential to streamline all transport modes and make them faster, safer, and more reliable. The huge amount of information being gathered through the EU-funded TransportingTransport project is already yielding positive results in achieving this aim, from rapid detection of faults on rail links to improved traffic management of roads and faster turnaround time for aeroplanes.

Each of TransformingTransport's seven domains has made advances in using Big Data to improve transport. Here's a quick look at each pilot domain and what it has achieved so far.

1. SMART HIGHWAYS

The Smart Highways pilot domain is working on minimising congestion, optimising infrastructure and reducing accidents in road transport. It is taking place on the 105 kilometre Ausol highway, a highly-congested semi-urban corridor connecting the cities of Málaga, Estepona and Guadiaro in southern Spain. The pilot is being replicated for the Auto-estradas Norte Litoral motorway in northern Portugal which stretches over 119 km from Oporto to Caminha and from Viana do Castelo to Ponte de Lima.

Progress on the pilot has involved the implementation of emerging technologies such as Bluetooth/ WIFI detectors or Distributed Acoustic Sensing over optic fiber cable buried along the roadside, with the aim of advancing the development of algorithms to predict highway events such as traffic jams and incidents. The preliminary results to date are very promising. The year 2018 will see the potential of Big Data, Machine Learning and internet-of-things technologies working together to the benefit of the road system.

2. SUSTAINABLE CONNECTED VEHICLES

Sustainable Connected Cars Pilot

This pilot was designed to bring an estimated savings of at least 25 % in operating expenses through better maintenance, as well as reduction in fuel consumption based on better routing and driving patterns. Its expected benefits will also include enhanced safety, predictive maintenance through pattern recognition, as well as enhanced and more competitive insurance models.

The pilot team has already successfully set up the required big data infrastructure. It has implemented several Application Programming Interfaces (APIs) to received data concerning vehicle breakdowns. The pilot also signed an agreement with a car fleet company which will be providing necessary data. With respect to KPI assessment, progress continues on improving the related algorithms.

Sustainable Connected Trucks Pilot

The connected trucks pilot was designed to upgrade the reliability of transport services by analysing big data from road users, satellite images and traffic events. This enhances the resilience of supply chains, improves the accuracy of transport planning and minimises traffic disturbances.

The pilot already established the initial infrastructure to integrate different data sources into the operational planning system. Truck traffic data sets for several countries and areas around Europe have also been gathered and analysed.

The data helped identify and analyse important areas in Europe with heavy truck traffic, such as truck corridors in Lyon, the Frankfurt Interchange based on satellite images, and waiting times at the Eurotunnel. Subsequently, truck speed patterns based on floating car data and approaches for reliable routing were evaluated for the next testing and demo phases in the pilot.

3. PROACTIVE RAIL INFRASTRUCTURES

Predictive Rail Asset Management Pilot

In its effort to improve rail maintenance using Big Data, the Predictive Rail Asset Management Pilot operating on the Euston - Rugby railway line in the UK has extracted 32GB of rail-related data in various formats from data sources such as weather stations, specialized measurement trains, electrical sensing units, track circuits, maintenance records, and much more. The data sets were then converted to a single common file format and language so comparisons and manipulations could more easily be performed. When the data was extracted from its relational database and proprietary formats into a format that can be handled by Big Data processing engines, it grew to over 5.5TB in size.

While early insights from the data are at a basic stage, fault detection can now be placed within several miles. The pilot team is experimenting with Natural Language Processing to identify fault location more accurately by extracting key information from free text fields. The team did however find that 22% of maintenance-related incidents between Euston and Rugby occurred less than one mile from Euston, noting that some stretches of track are far more prone to incidents than others. The findings bode well for developing better predictive technology for rail maintenance once the pilot is completed.

Predictive High Speed Network Maintenance Pilot

The Predictive High Speed Network Maintenance Pilot has made valuable progress in collecting data related to maintenance activities and train circulations, in addition to completing an initial analysis of the data. The analysis focused on the relationship between the quality and quantity of the data (i.e. comparing a small quantity of ‘high quality’ data with a large quantity of ‘low quality’ data).

The most important source of data identified in line with the pilot’s main objectives is the output of the dynamic and geometrical inspections. The dynamic inspection provides information about the interaction between the train and the track itself, while the geometric track inspection provides information about track width, alignment, warping, and standard deviation analysis.

In addition, the project team has been working on a new objective, which is to optimise the use of the railway infrastructure by incorporating information about infrastructure failures in railway operation using the DaVinci train management system. This would ultimately result in a real-time system that uses the results of a predictive model, along with traffic data, and planned schedule of trains.

4. PORTS AS INTELLIGENT LOGISTICS HUBS

The pilot project on Ports as Intelligent Logistics Hubs has made important progress on three different fronts. Firstly, it has successfully developed an optimisation algorithm to define the most efficient order for processing working instructions in a single yard block within a port terminal. On the pilot site itself, the project team deployed a novel maintenance predictive infrastructure to identify in detail the reason of failure of a spreader, i.e. the device used for lifting containers and cargo. Lastly, the pilot team completed and released the preliminary prototype of a decision-making cockpit that shows stakeholder-oriented KPIs to support planning tasks. All three achievements will contribute to advancing ports as the ultimate smart logistics hubs.

5. SMART AIRPORT TURNAROUND

Getting travellers through airports in a more efficient way is better for operations, business and the environment. The initial pilot in Athens Airport, under the Smart Airport Turnaround pilot, performed a classification of passengers into three categories, namely transit, economy and business travellers. Results from the pilot's initial analyses have clearly revealed different behaviour types among arrival passengers, depending on type of flight (domestic or international), departure time and day of the week.

Transit passengers exhibited different behaviour clusters depending on waiting times between their flights. Clear differences were observed between airside passengers (i.e. those in the area of an airport that is within its passport, customs control and security checks) versus those who leave the airside area and return to cross the security area 1 or 2 hours before their flight.

The replication pilot has analysed data from Milan's Malpensa Airport and the results showed great potential for the application of Big Data technologies to improve the efficiency of airport operations. The pilot is focusing on increasing the predictability of the most important turnaround measurements which include actual time of arrival, taxi time in and out, boarding time and actual time of departure. Like in the initial Athens pilot, the replication pilot found recurring behaviour clusters for different airlines and boarding gates, depending on the day of the week and departure time of the flight. The findings will be valuable in supporting airports and airlines to plan required staffing and adapt processes proactively in order to avoid delays.

6. INTEGRATED URBAN MOBILITY

Tampere Integrated Urban Mobility Pilot

The objectives in the Tampere pilot under the domain of Integrated Urban Mobility are to provide tools for the urban Traffic Management Centre (TMC), drivers and travellers, as well as to provide tools for goods delivery vehicles to access parking places in the city centre.

The pilot project has developed different tools in this respect, including an application for extracting social media content related to traffic events in Tampere, and a tool that analyses traffic camera input to identify traffic jams. Achievements also include a parking place reservation tool for goods delivery in the city centre, as well as a tool for automatically informing travellers on disturbance using social media feeds. This tool has been taken into use and has a fast-growing number of followers. In this respect, the Tampere pilot is well on its way in achieving its objectives.

Valladolid Integrated Urban Mobility and Freight Pilot

The Valladolid Urban Mobility and Freight pilot has developed and validated different data analytics algorithms to extract knowledge based on historical data from 2016. Using information from several traffic and GPS data sources a discrete events model has been implemented and is being validated with actual data from 2017. Based on this traffic model different scenarios related to logistic loading and unloading protocols on public roadways in the city centre are being analysed in order support city authorities in taking the right decisions to improve urban mobility.

7. SHARED LOGISTICS FOR E-COMMERCE

The Dynamic Supply Network pilot is investigating how the application of advanced business analytics, can transform the existing e-commerce logistics processes and bring value to all involved stakeholders, including third-party logistics companies, online retailers and final consumers. Following a three-step procedure including comprehensive literature review, semi-structured interviews with popular online retailers and couriers, and finally, onsite observation and discussions with the pilot EPL data provider, the pilot team identified five different scenarios for Big Data application:

(a) Identification of delivery patterns, logistics issues and forecasting
(b) End-to-end information sharing among third party logistics companies, online retailers and couriers
(c) Shared Micro-Hubs where customers collect their online orders
(d) Inventory routing in an omnichannel environment
(e) Online consumer insights regarding logistics and delivery

The team is currently analysing the data for each scenario in order to show how Big Data implementation could bring significant improvements in terms of cost and customer service.

If you are interested in the TRANSFORMING TRANSPORT initiative, or if you have questions, please contact info@transformingtransport.eu

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