

## **ADEPT Live Labs Highway Assets Data-Led Management Solution**

Identified workstreams are detailed below.

The project expects to generate several benefits and projects within its lifecycle around data, which will be delivered through a number of work packages. The below workstreams are larger focused projects that we expect to deliver on top of the operational platform and strategic platforms outline in the report.

### **Smart Gullies**

This workstream aims to deliver a smart gully asset management solution using the cutting-edge sensor and Internet of Things (IOT) technologies. Amey and Map16 jointly delivered a trial called “Smart Gully” under the Kent Lane Rental Scheme funding in July 2019 in Kent that involves the testing of 100 sensors installed in the Maidstone area. This trial achieved positive results. Each sensor has given accurate information of the water fill level and silt level. This information has been presented on a user web interface in real time. The plan for the Live Lab is to roll out more sensors across a much larger Kent network, as well as providing the sensor data feeds to the cloud-based operational platform so the gully information would be presented and searchable along with the other assets on the same platform. This innovative solution would give the asset managers a clear view of the live gully conditions across the Kent district, so cleansing and maintenance can be arranged on an ad-hoc basis. Data analytics such as Machine Learning will be applied by Amey Strategic Consulting to analyse the patterns of the historic data collected throughout the project, enabling the realisation of an intelligence-based and proactive drainage asset management approach, which will deliver significant cost reduction for KCC.

### **Smart Road Condition Monitoring**

This workstream aims to deliver an efficient and low-cost solution for remote monitoring of road conditions and detection of potholes by utilising vehicle telematic data. Telematic data, collectable through in-car sensor units installed inside the insurance boxes, can be a cheap and rich source of data valuable for understanding the condition of the roads the vehicles drive on. In an innovation project Amey delivered for Transport for West Midlands in Birmingham early in 2019, it has been proved that we can develop Machine Learning algorithms to translate part of the telematic data into road surface quality, also to predict the number of potholes for a section of road networks. For Live Labs, we plan to focus on rolling out the sensor installation across the Amey fleet vehicles in all depots in Kent, and further develop the algorithms, as well as integrating the outcomes of the pothole detections into the operational platform for visualisation. This solution, if successful, will deliver huge financial benefits to Amey and KCC by automating a large part of the current road condition monitoring and inspection services which is labour intensive.

### **Smart Road Asset Monitoring**

This workstream will build on the successful initial learnings Amey developed through the CAV (Connected and Autonomous Vehicle) projects in recent years. Through collecting LiDAR data, and potentially video footages, of the surrounding environment of the vehicle, we are able to use data analytics to identify any defects of the road assets such as bus shelters, lamppost and road signs. For Live Labs we plan to collect data over the large strategic road networks of Kent. We aim to deliver an innovative solution to automate the process of road-side assets inspection by asset managers, which would achieve great cost reduction and process optimisation for Amey and KCC.

### **Smart Winter**

The aim of the Smart Winter programme is to produce data and analysis that can be used to:

- provide evidence for future spending on Winter Services;
- provide evidence that can be used in the defence of claims; and
- identify potential for operational savings

During Phase 1 of the Smart Winter programme a county wide network of internet-connected temperature sensors was installed. The sensors were installed on primary gritting routes over the course of 2018 to record road surface temperature (RST) and air temperature (AT) at regular intervals, with live and historic readings available from the Wintersense website. The main findings from this phase demonstrated:

- there is potential to reduce the total gritting distance by up to 34.3% (an average of 58,172 km annually for the previous three seasons);
- the number of nights on which gritting takes place could be reduced by up to 11.1% (an average of 6 nights annually for the previous three seasons); and
- if these reductions were achieved, £232,687 of grit could be saved annually in addition to any savings on costs of delivery.

Phase 2a, which aims to optimise the existing gritting routes and develop a surface moisture sensor is currently underway. Phase 2b, will provide a more detailed analysis of the sensor data that will be used to develop predictive models of RST which could form the basis of AI based decision support tools.