

Digital Innovation and Efficiency Committee

Report title:	Use of Technology by Highways
Date of meeting:	12 September 2018
Responsible Chief Officer:	Tom McCabe – Executive Director, Community and Environmental Services
Strategic impact The Norfolk County Council Strategy 2018-21 recognises that we need to transform the way we work to keep up with changing demands and deliver sustainable and affordable services to those that need them the most. This transformation is guided by four key principles: • Offering our help early to prevent and reduce demand for specialist services • Joining up our work so that similar activities and services are easily accessible, done well and done once • Being business-like and making best use of digital technology to ensure value for money • Using evidence and data to target our work where it can make the most difference Embracing new technologies and innovation to help deliver efficiencies and better inform service priorities is therefore a key aspect of the transformation strategy across all services.	

Executive summary

The Highways service has a good track record in embracing digital and technological innovations that can deliver efficiencies, service improvements and a better way of working. As a service we are always keen to explore future opportunities.

The following report outlines examples of where the Highways teams have recently exploited such technology, introduced some technological developments, and goes onto to highlight areas that we are considering for the future.

Recommendations:

To note the information provided in this report.

1. Proposal

- 1.1 Members are invited to consider and discuss the various innovations in the report.

2. Evidence

2.1 Technology currently in use across the Highways service

Below is a summary of some of the recent technological advances in the highways service.

2.1.1 Street lighting

With approximately 53,000 streetlights across Norfolk this is a significant asset. There has been a variety of technological initiatives that we have delivered to

help make savings despite the number of streetlights continuing to grow. Some of these initiatives are described below. They have helped us make cumulative savings of over £1.6 million. (£450,000 alone in 2016/17).

2.1.1.1 *LEDs*

LED or Light-Emitting Diodes are more energy efficient for street lighting and have the added benefit of being cheaper to maintain than older technologies. The white light they emit also provides better contrast in lit areas so lower intensity light can be used without sacrificing visual quality or highway safety. Since 2008, we have replaced 9,814 regular street lamps with LEDs and plan to install a further 13,000 throughout 2018 and 2019.

2.1.1.2 *CMS lighting*

Central Management System (CMS) lighting allows us to remotely control street lights using computer software to determine the way an individual light or groups of street lights operate. We can program changes in the way they operate at any given time which allows for more flexibility to implement lighting patterns like 'dimming' which can reduce energy usage.

2.1.1.3 *LumiMotion*

A more recent innovation in street lighting, LumiMotion, has been installed on a Norwich Cycleway in Heartsease. The technology minimises light waste by sensing the activity of passing pedestrians and cyclists and lighting up the path accordingly. The system is designed to save energy costs without compromising safety.

2.1.2 **Intelligent Transport Systems (including traffic signals)**

2.1.2.1 *Central Fault Management System*

Our contractor uses a central fault management system which allows remote control/maintenance of permanent traffic signals and flags up automatically when there is a fault.

2.1.2.2 *Creating a wireless network*

A Communications Project being delivered by our contractor, the objective of which is to replace BT's leased lines to traffic lights with a wireless network, has now been accepted and signed off. The implementation of this project was necessary as BT were withdrawing their leased lines nationally and a new way of communicating with traffic signals was required.

2.1.2.3 *SCOOT*

SCOOT is a system programmed to detect when tracked buses are late, and as long as it doesn't cause serious disruption to traffic flows, either hold a traffic light on green or turn a red light back to green to keep the bus moving.

2.1.2.4 *MOVA*

MOVA or 'Microprocessor Optimised Vehicle Actuation' relates to the control of traffic light signals at isolated junctions. It allows us to keep traffic moving and can help minimise congestion.

2.1.2.5 *Signage – Car park information*

We have electronic signs at various locations to provide real-time information on parking availability at car parks. This helps keep the network moving and provides useful information to the public looking for a space. These are fully funded by the County Council.

2.1.2.6 *Inrix trial – Use of 'Big Data'*

The Network Safety and Sustainability team are currently trialling new software to help monitor congestion and traffic flow. The software makes use of data from many different sources including information collated from satellite navigation

devices used across the county. This data allows us to see in real-time the average journey time of a specified journey and compare it to the same journey made 2 or 3 years ago.

The trial started in April so the potential uses of this 'big data' is still being explored. However, those that have been using this interactive tool propose that the use of such 'big data' could negate the need for installing loops in the road as it provides much richer data than traditional methods.

There is also potential that this could help better inform priorities, monitor impact of schemes and help us keep the network moving. The team is looking at extending this trial into the next financial year so we can examine further the potential benefits across the department. A business case is being prepared in the coming months to help secure funding for this extension.

2.1.3 Customer fault reporting

2.1.3.1 *Online Reporting Form*

As previously reported to this committee, an online fault reporting form was developed to allow customers to report defects online, see existing defects of a similar nature (to avoid duplications) and for those that register, they can receive automatic updates on the defect they have reported.

The faults go directly to highways service without the previous requirement for our Customer Service Centre to manually intervene to assign to relevant areas.

Following collaborative sprints earlier this year a variety of improvements have been made to the form including improved information in customer accounts, additional status options, more information in emails and the ability to attach photographs.

There are some further developments that will be deployed shortly to improve the customer journey further. This includes the use of icons and limiting the amount of duplication experienced by the customer. The outcomes of these improvements are closely monitored by our Customer Service team who monitor web satisfaction feedback to help inform future improvements that may be required. We are also aware of and exploring potential future enhancements based on existing applications (apps) such as Love Clean Streets and report it GY, which offer the customer the ability to report issues on their Smartphones direct.

2.1.4 New Highways Management System

2.1.4.1 *Automation of processes*

A new Highways Management System went live April 2016 which has allowed for the automation of some processes where paper and manual user input was necessary.

2.1.4.2 *Mobile Working*

A significant change was the adoption of mobile technology across the highways service allowing remote working. Mobile tablets are now used by inspectors, technicians and our internal works contractor. They have also been utilised by some of our specialist external contractors too.

- Customer reported defects get sent straight to devices so technicians/inspectors can see them when out and about.
- Staff can sync their work without having to return back to the office.
- Photos can be taken on site and be saved against the defect record.
- Work can be issued remotely.
- Reduces the need to print and manual data entry.
- Satellite navigation allows users to navigate to location of defects/work

The use of this technology has allowed us to change the operational Area structure in 2017, delivering £175,000 in savings.

2.1.5 Reporting & Data Analysis

In recent years we have been taking steps to improve our reporting and data analysis to help enable performance management, inform decisions and identify areas of improvement. Predictive analytics is of particular relevance to highways to make sure we are utilising our resources in the most efficient way possible.

2.1.5.1 *Power BI*

The service has been working closely with our colleagues in the Information Management Team (IMT) to build Power BI reports using operational data from the highways management system. This facility helps us establish visual reports that update automatically on a daily basis. The reports will help us compare and contrast highways data, inform risk assessments and assist with planning.

2.1.5.2 *Gully Cleaning Frequencies*

A multi-criteria analysis was undertaken using digital data including previous gully cleaning records, flood risk maps and reported drainage defects to determine a risk based approach to our gully cleaning schedule. In conjunction with Tarmac, this initiative has recently been shortlisted for the national Highways Maintenance Efficiency award. The winner of the award will be known in October 2018.

2.1.6 Tracker Technology

We make use of vehicle tracker technology on our highway vehicles. As well as helping to inform the delivery of such services like winter gritting (which in turn helps us identify efficiencies) it also enables the coordination of vehicles to deal with any potential emergency responses required.

2.1.7 Road Safety Signs

The road safety team have been working with a company called Westcotec to install mobile phone detection signs to help identify mobile phone use in vehicles. The intention is that, as well as being a deterrent to motorists and increasing awareness, this information can be shared with Norfolk Police to help crack down on those using mobiles behind the wheel. This is one of the key motoring offences which make up Norfolk Police's 'Fatal Four' campaign. This initiative has received both national and international press coverage.

2.1.8 Automated Construction Technology

The Highways Laboratory has been working closely with Tarmac to develop and deliver automated construction technology. This system collects data during the laying process which can lead to improvements in how materials are laid, reduce defects that can result in early failures and also increase the county's surface replacement cycle time.

2.1.9 Strain Gauges

These devices were installed at the recently developed sites at Postwick and Broadland Northway, to allow our laboratory to monitor the strain on the road from traffic and how well the specified construction performs. Norfolk are one of the few authorities to have made the strain gauges produce reliable information and the programme is being jointly funded with Highways England, who are keen to learn from Norfolk's experience in this area.

2.1.10 Thermocouples

The Highways Laboratory has installed thermocouples in the A140 road at Scole. The data they produce is used by asphalt suppliers and bitumen producers to monitor changing surfacing temperatures to consider and inform changes to

product design. The potential outcome of the data provided by monitors such as these could be a change in the way roads are constructed in the future.

2.2 Looking Forward

Below is a summary of some of the upcoming technological advances we are looking to deliver in highways in the near future as well as an update of technological advancements across the industry.

2.2.1 Delivery of the Winter Service

2.2.1.1 *Auto Salting*

We have been trialling the use of automated gritting in Great Yarmouth. This will automatically control the spread rate and width to allow the driver to focus on driving with the aid of satellite navigation. This improves road safety as well as increased reliability of gritting. There is also a potential to review the quantity of salt spread to identify savings in salt costs (which accounts for 30% of the total costs of gritting actions).

2.2.1.2 *Weather Stations*

The use of weather stations is essential to the efficient delivery of the winter service. In recent years we have already made savings by recognising that road surface temperatures are different across the county. Therefore, when we treat the county in a gritting action, we do so on a domain basis rather than the whole network. To enable this more detailed approach, a network of weather stations is utilised. Six of these are NCC owned and six are Highways England's. A full weather station costs in excess of £15,000. However, smaller, more basic and more mobile weather stations cost in the region of £4,000 each. Several years ago, Highways teams proved that there is a natural heater island effect within Norwich due to its urban nature. This enabled the creation of a Norwich domain, which tends to be gritted far less than the surrounding domains. We will be compiling a business case shortly to bid for £8,000 to procure two weather stations that we intend to install in King's Lynn and Great Yarmouth, to investigate whether this heater island effect is also present in these urban areas. If proved to exist, an immediate return on this investment could be realised.

2.2.2 Automation of Surface Dressing Works

The surface dressing supply chain are investigating automated construction similar to surfacing machine technology. The Highways Laboratory are involved in these investigations to automate surface dressing operations. If successful, this will improve understanding of what is laid where, and in what weather conditions etc.

2.2.3 Ground radar

The Highways Laboratory are investigating the use of ground radar to check that utility trenches have been correctly reinstated without the need to take cores from the trench lines.

2.2.4 Smart Parking

Already in some parts of North Norfolk you can pay for parking with a smart phone. Looking towards the future we need to carefully consider our approach to parking with the advent of new technologies. The outcomes of which will depend on how forward thinking we intend to be and how well we can forecast the potential uptake of emerging technology. There is a risk that we could spend money on existing technologies (e.g. the replacement of on street parking meters) which could be obsolete in a few years' time.

As well as charging for parking there is potential that smart sensors could be

used for targeted enforcement and potentially bring in more revenue.

The use of smart parking by local authorities is something we will continue to monitor across the industry. These issues will also be explored as part of the upcoming review into the Better Parking Strategy.

2.2.5 Smart Cities

We are paying close attention to how we may be able to make use of our existing street lighting, weather stations and traffic signal assets to connect, track and obtain a variety of data to inform decisions. We are aware of other local authorities that are trialling the technology and we have engaged with companies such as enLight, Findlay Irvine and LED Roadway to understand what they can offer and to explore potential trials. We will continue to pay close attention to this developing technology in the industry to realise the maximum efficiencies and benefits possible.

2.2.6 Use of 'Big Data' companies

As mentioned in 2.1.2.6 we are currently trialling Inrix, which compiles traffic information from a variety of sources and are examining the practical uses of this information across the service. As we face continued pressures on resource, we may need to work more with big data companies to provide information that we can no longer afford to obtain. We are also considering any commercial opportunities which may arise by utilising Council assets, which may help offset future costs by providing an income.

2.2.7 Innovations in the Industry

As a member of a variety of organisations and industry bodies, we are made aware of a variety of innovations across the industry to help determine best practice and future opportunities. Some of these initiatives include:

- Digital inspections - Use of council vehicles to spot potholes (Trial funded by the Department of Transport, rolled out in Wiltshire, York and Thurrock). Similar Vehicle surveillance solution described at Traffex 2018 where the surveillance is fixed to standard estate car or 4 x 4 car providing real time camera operation and viewing from remote locations. Potential to save operatives being on site.
- Smart phone sensors to collate road conditions.
- Read-guard vertical mobile solar powered barrier - this can be fixed to the road surface temporarily or on a pallet. The gate is operated by a key fob or mobile app for authorised access only – this could potentially replace “gatemen” at road work sites, saving potentially 2/3 gatemen on Tarmac surfacing sites.
- Gully sensors – Road drainage gullies that let you know when they are full & need emptying.
- Use of sonar, underwater cameras and drones to assess bridge conditions.
- Bio fuel.

We will continue to monitor progress in the industry and review areas where there is potential to improve service or efficiency.

3 Financial Implications

3.1 There are no financial implications in this report.

4 Issues, risks and innovation

4.1 There are no issues or risks to mention as part of this report. The Highways

service is aware that there are potential issues and risks when adopting any new technology. Keeping up to date with trials and innovation across the industry can help minimise these risks.

5 Background

- 5.1 Industry report from ADEPT (October 2017) [Digital Innovation: The route to highways systems of the future](#)
- 5.2 White paper from WSP [New Mobility Now](#)
- 5.3 [Local Authorities' Smarter Traffic management Conference](#) (November 2017) – A report by the Transport Technology Forum organised on behalf of the Department for Transport in partnership with the IET.

Officer Contact

If you have any questions about matters contained in this paper or want to see copies of any assessments, eg equality impact assessment, please get in touch with:

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