SWARCO &
Derbyshire County Council

The role of Intelligent Transport Systems in enhancing efficiencies and creating a more connected transport network throughout Derbyshire.

Introduction

The county of Derbyshire in the East Midlands, with an estimated population of just over 800,000, is home to the bustling cities and towns of Derby, Buxton and Matlock and is renowned for having a large portion of the Peak District within its borders.

In 2015 Derbyshire County Council (DCC) published its initial Intelligent Transport Systems strategy, which set out its vision for ITS development throughout the county over the next 5 years. The plan recognised the link between reliable and dependable transport infrastructure and economic growth, with a particular focus on increasing capacity and network efficiency without the need to invest significantly in construction and installation of new infrastructure.

With traffic growth outpacing road capacity by some margin, the Council sought a solution for more efficient use of its existing network.

Background/Challenges

Following a successful funding application with the Department for Transport, the Derbyshire Highways Hub Advanced Real Time Information project was setup, to provide data analysis of the network and interventions through variable messaging signs, virtual variable message signs and traffic signal installations. This would require the installation of an Urban Traffic Control System and an Urban Traffic Management and Control System.

DCC announced a tender process seeking a technology partner to help assist its plan to achieve the wider objectives of reducing congestion, encouraging modal shift, improving overall traffic, and local transport throughput and utilisation.

All transport and highways related activities and enquiries are managed via DCC's Highways Hub, a department of around 40 staff incorporating several core and support teams working together. One of the biggest challenges the Council and the Highways Hub department faced was a lack of coordination between existing network management infrastructure and systems. It had multiple systems and products from a variety of manufacturers across different locations throughout the county, which were not integrated.

The lack of infrastructure connectivity reduced the real-time information available to the public, meaning the management of the network was reactive and not proactive, further reducing efficiencies.

The Vision

Fundamentally, DCC and the Highways Hub needed to work with a technology partner that could install and integrate an intelligent and flexible Traffic Management System (TMS) to

improve the efficiency of the existing road network and manage traffic flow across the County. They required a hosted solution that could seamlessly integrate and interface with the Council's existing systems into one platform with the ability to collect, store and analyse data collected from systems, solutions and hardware across the network. They needed a single platform where users could access all the tools they require through user terminals, along with a control room to help facilitate operational traffic management interventions throughout the County.

The vision for the TMS solution was a coordinated and data-driven approach to allow:

- Collection of relevant network condition data
- Storage and analysis of data for interventions
- Provide management information and reporting to support effective decision making
- Implement different control strategies to manage network conditions

The TMS had to be flexible, expandable, and configurable to support future functions and geographical expansion to cover other parts of the County and business needs.

Following a successful competitive tender process, SWARCO UK and Ireland won the contract for the work.

Technology Used

Technology is an essential tool in keeping data, goods and people moving safely every day across UK road networks. Road transport authorities have a broad range of technology assets such as traffic signals, variable message signs (VMS), CCTV cameras and road sensors from different providers, different eras and with varying software interfaces, which can make the simplest of traffic management tasks difficult, disruptive and time consuming.

An Urban Traffic Management Control (UTMC) platform resolves these challenges by managing and controlling multiple technology assets in real time and from one accessible place.

SWARCO's MyCity UTMC is a secure cloud-based platform for the strategic, dynamic and holistic management of road network infrastructure, that enables road network operators to monitor and control connected roadside devices, from one online user interface.

It continuously gathers and analyses both live and historic traffic data from a wide range of sensors across the road network to build a comprehensive and detailed view of traffic behaviour. Any Changes in traffic patterns that are identified in near real-time by the Councils Pre-Emptive Traffic Management System are pin-pointed to the exact location via the MyCity UTMC interface, enabling operators and automated strategies to promptly and effectively intervene. This enables operators to better focus their time and utilise roadside assets to help alleviate congestion and keep traffic moving safely and efficiently.

Planned events can be easily and effectively managed as operators can set up traffic management strategies ahead of time, for example setting event signage or varying signal plans to account for different traffic patterns. These strategies are fully automated and activated based on the event schedule or near real time traffic data.

Integration

MyCity UTMC enables operators to integrate existing assets. Implementing the UTMC specification allows for maximum interoperability which in turn deliver significant cost savings. Operators can better manage the network for the benefit

Implementation – A phased approach

Ultimately any existing or new systems can be connected into the MyCity UTMC database. Based on Derbyshire's strategy and specifications SWARCO created a programme to allow Derbyshire County Council to add its existing assets and data sources onto the platform, rather than having to invest in any new equipment to control and monitor the network. SWARCO has worked with the Council to deliver an improved standard UTMC product core by adding new functionality and utilising external APIs to make the most of commercially available data sources.

This was a significant project in many ways, not least in terms of the number and variety of different data connections that were required. There were also challenges to overcome, such as connecting systems to the database that are not UTMC compliant or integrating competitors' systems and enabling all the systems and connections to work in a cooperative manner to ensure successful planning can take place and strategies can be constructed.

To address these issues, the solution was split into five phases; it started with creating the initial functionality and basic UTMC connections, prior to adding more complex connections and functions. The result is an ITS network that is fully co-ordinated with information from multiple systems collected in a central database, improving the management of the system.

The Results

The major benefit for the Council is having one system to monitor and evaluate data from multiple sources and disparate technologies together, rather than having multiple systems in various locations. It is more efficient, requires fewer personnel, and is more effective since the information is collected and can be acted upon with greater ease and confidence. MyCity UTMC solution is providing the following connections:

- Bus Open Data Service (BODS) provides real-time bus location data, viewed on a map, which allows the Council to visualise the current performance of the bus network and act as necessary. Using the real-time data on the performance of buses in Strategy Designer acts as a trigger for corrective action or alerts.

- Using the Eagle Eye network, the Council can also view snapshots from CCTV cameras and view a live video stream.

- For temporary traffic management and events, MyCity UTMC can also control Mobile VMS to set and view messages displayed on mobile signs in the same fashion as conventional fixed VMS.

- MyCity UTMC also represents Car Park Systems as standard Car Park Objects and regularly updates with real-time occupancy data.

- Pre-emptive Traffic Management System (PTMS) connection which uses floating vehicle data to pre-empt traffic problems by putting into place 'intervention packages' consisting of direct messaging to road users and the setting of VMS. These can be supported by technologies that include the Vaisala Web Service, for local weather conditions, and Drakewell C2 to inform about journey times, benefiting from automatic traffic counters.

- Communicating with road users, SWARCO has implemented a solution so that the Council can disseminate information about network conditions and planned events to the public and transport operators via news feeds, e-mail alerts or text based messaging to help them plan their journeys accordingly.

"This project is a great example of how SWARCO and Derbyshire County Council have enabled cooperation and coordination across the ITS network.
They have built upon the common database to collect new data sources and create strategies using that data has had a positive impact on our network. This project is also a great example of coordination between different ITS companies, as we have a diverse range of equipment from multiple suppliers."

– **David Hilton Barber, Technology Lead, Place, Derbyshire County Council**

Making the connections

The following connections have been made to the MyCity UTMC from external sources:

- CCTV Cameras
- Derbyshire County councils Pre-Emptive Management System
- Varieties VMS and PGI signs
- Mobile VMS signs
- Varieties Car Park systems
- Urban Traffic Control System
- Air Quality devices
- Drakewell Journey Time Connection
- NTIS – DatexII Connection
- Street Manager Roadworks Connection
- Vaisala Weather station devices

The following connections have been made from the database to external sources:

- Email Alerts
- PTZ commands to CCTV Cameras
- VMS status and settings
- UTC Commands

The system is still able to support more connections to allow more systems to be connected in. On the future expansion list SWARCO and Derbyshire County Council are discussing:

- Flood Monitoring with the environment agency data feed
- Air quality connections for physical and virtual detection systems
- Flashing Amber Warning system connections for legacy on street equipment
- Bus Priority Improvement scheme integration