<u>JCT Submission 2025:</u>

'What's data got to do with it?" by Andrea Newman, Swarco UK and Ireland Ltd

Introduction

The case studies in this document explore the impact of providing real-time data to drivers on their decision-making and travel behaviour. Specifically, it examines whether access to information—such as road network conditions or car park occupancy—can influence route choices, reduce congestion, and improve overall traffic flow. The aim is to assess how data-driven insights can empower drivers to make more informed decisions, thereby supporting more efficient and responsive urban traffic management.

To understand how data can influence the behaviour of the travelling public, it is essential to consider the types of information drivers can access and interact with during their journeys. These include Variable Message Signs (VMS) displaying real-time updates, adaptive traffic signal controllers, digital maps showing journey time estimates, and parking availability indicators. Such systems are increasingly supported by Cooperative, Connected, and Automated Mobility (CCAM) technologies, which enable vehicles and infrastructure to share data in real time, enhancing the accuracy, responsiveness, and personalization of travel information.

When such data is made accessible, can it empower drivers to make informed decisions rather than relying solely on habitual routes or navigation systems. For example, can knowing the number of available spaces in a car park or the expected travel time on a specific route enable drivers to evaluate their options and adjust their plans accordingly. This shift from passive to informed decision-making is a key factor in managing traffic flow and reducing congestion across the network.

Travel behaviour data in the UK reveals a strong tendency toward routine-based journeys. According to pre-pandemic figures from 2019, the most common trip purposes were **shopping (181 trips per person per year)**, **commuting (140 trips)**, and **personal business (88 trips)**[1]. These statistics indicate that a significant proportion of drivers follow **repetitive, familiar routes** as part of their daily or weekly routines. This habitual travel pattern presents both a challenge and an opportunity: while it can contribute to predictable congestion points, it also means that **targeted, real-time data interventions**—such as journey time updates or parking availability—can be strategically deployed to influence route choices and ease pressure on the network. Also by optimising these interventions for energy efficiency, such as recommending less congested or topographically favourable routes, there is potential to reduce emissions and extend battery life in electric vehicles.

Insights from the Department for Transport's *National Travel Attitudes Study* and *National Travel Survey* reveal consistent behavioural patterns among UK drivers[2]. A substantial proportion of motorists report regularly using the same routes, particularly for routine activities such as commuting and shopping. These findings suggest that **habitual travel behaviour is prevalent**, with many drivers favouring familiar routes even when alternative options may offer reduced travel times or less congestion. This tendency underscores the importance of providing timely and relevant data to encourage more adaptive and efficient route choices.

[1] https://toptests.co.uk/driving-statistics/

[2] https://www.gov.uk/government/organisations/department-for-transport/about/statistics

Case Study 1: The Impact of Real-Time Car Park Occupancy Data on Driver Decision-Making

Providing drivers with timely and accurate information about the road network and parking conditions plays a critical role in shaping travel behaviour. This case study from Council A illustrates how access to real-time car park occupancy data can influence driver decisions and contribute to more efficient traffic flow.

Council A operates a parking guidance system that displays live occupancy data for car parks across the region. This case study is representing a member of the travelling public, where they are looking for a car park space in Park Street Car Park. How does a member of the travelling public decide if they can park in Park Street car park when travelling down Victoria Avenue?

Figure 1: Victoria Avenue - VMS

<u>Scenario 1: Limited Information</u>

A driver (green car) approaching from the north sees a VMS (P4 Victoria Avenue) displaying the message “OPEN” for Park Street Car Park, along with a note about alternative parking in the opposite direction.

The only information the driver is informed about is that the car park is open, but all of the spaces might be filled, or there might be a long queue going into the car park, they may have to wait a long time. The driver needs to make a decision at the roundabout, do they go right towards the Park Street Car Park or do they go left towards alternative parking?

With no indication of how many spaces remain, and needing to reach an appointment at Westcott House, on this occasion the driver opts to avoid potential delays and turns toward the alternative parking area and doesn't park at the Park Street Car Park.

Figure 2: Green car decision from VMS information

Scenario 2: Data-Driven Decision

Another driver (red car), also approaching from the north, sees a VMS (P4 Victoria Avenue) displaying "162 spaces available" at Park Street Car Park, still with the additional information about additional parking in the opposite direction.

The driver now has the information that there are 162 spaces in the car park, the driver can think, how likely is it that 163 cars will fill those spaces before the driver in the red car gets there. If the driver of the red car goes to find alternative parking, those car parks might also be full. The driver needs to make a decision at the roundabout, do they go right towards the Park Street Car Park or do they go left towards alternative parking?

With the spaces information, the driver reasonably concludes on this occasion, that it is unlikely all spaces will be taken before arrival. As they are meeting friends at a nearby location, they proceed confidently to Park Street and park without issue.

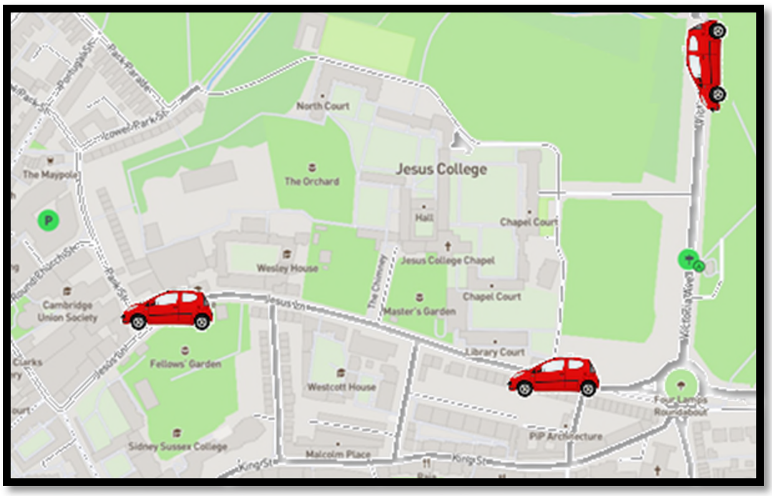

Figure 3: Red car decision from VMS information

These scenarios demonstrate how **real-time data empowers drivers to make better-informed decisions**, reducing uncertainty and improving the efficiency of the road network.

<u>How the data flow can be used with system integration</u>

In this case study, data is collected via entry and exit loops at Park Street Car Park and transmitted through the UTMC Count Controller to the SWARCO MyCity platform.

The system processes the following data points:

- Number of available spaces
- Total car park capacity (175 spaces)
- Timestamp of the last data update
- Entry and exit counts

This data is then used to dynamically update VMS displays.

The system is configured to show automatic text colours:

- **Green text** when occupancy is below 93%
- **Amber text** between 93% and 98%
- **Red text** when occupancy exceeds 98%

This colour-coded approach provides an intuitive visual cue to drivers, further enhancing decision-making at a glance.

Case Study 1 conclusion

A driver approaching Park Street Car Park via Victoria Avenue sees a Variable Message Sign (VMS) indicating that **162 spaces are currently available**. This level of detail allows the driver to make a confident, informed decision about whether to proceed to that car park or consider alternatives.

In contrast, if the VMS simply displayed a generic message such as "OPEN" or "SPACES," the driver would lack the necessary context to assess availability. They might assume the car park is getting full or anticipate long queues, prompting them to divert unnecessarily—potentially increasing congestion elsewhere.

Therefore, the **more data drivers** are provided the **more informed decision** can be made whilst driving on the road network.

From a traffic planning perspective, the availability of accurate data enables more predictable driver behaviour. If most drivers respond like the green car driver—avoiding uncertain destinations—this could lead to increased congestion around alternative parking areas. Conversely, when data is clearly communicated, as in the red car scenario, it helps distribute traffic more evenly and reduces unnecessary diversions.

Case Study 2: Journey Time Data and Its Influence on Route Choice

Access to real-time journey time data can significantly influence driver behaviour, particularly when it comes to route selection. This case study from Council A demonstrates how providing travel time information at key decision points can help drivers avoid congestion and improve overall traffic flow.

Council A implemented journey time monitoring along a major route from **Huntingdon to Cambridge,** covering a stretch from the Spittals Interchange Roundabout to Murkett's Corner via the A141, A14, and A1307. Data collection on this route began on **29 January 2024**, with the average journey time recorded at **23 minutes and 20 seconds,** up to 7 May 2024.

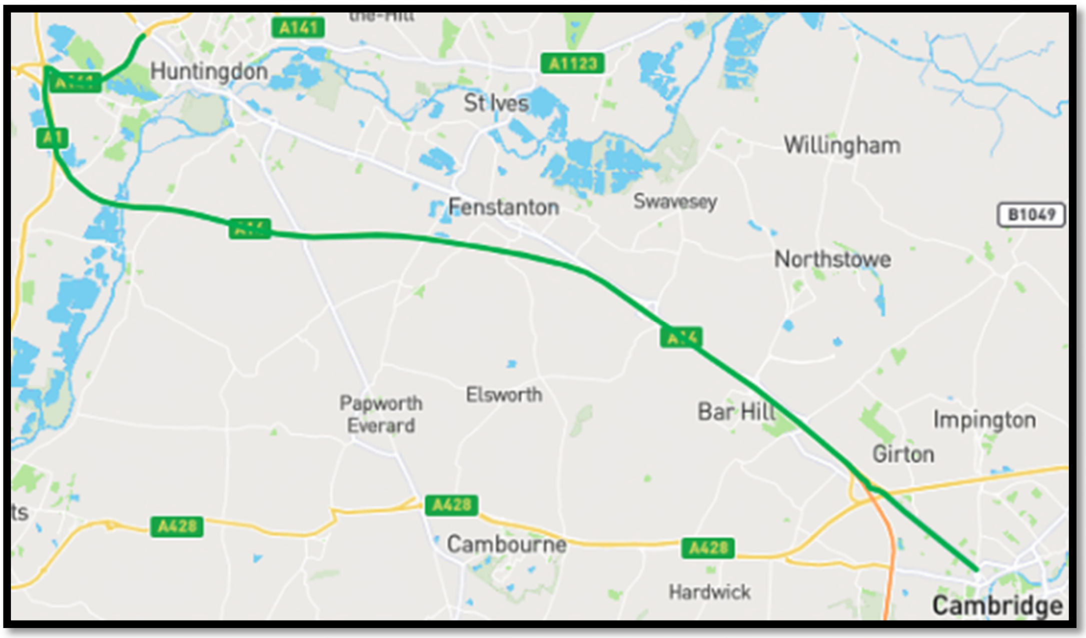

Figure 4: Journey time link - A141 Huntingdon to A1307 Cambridge

To support informed decision-making, a Variable Message Sign (VMS)—Sign V08—was used at the start of the route, to inform drivers about the current travel times from Huntingdon to Cambridge.

Figure 5: Journey time link start with VMS sign

From **7 May to 11 October 2024**, this sign intermittently displayed real-time journey time information.

Figure 6: Message displayed on VMS

During this period, the average journey time was recorded as **23 minutes and 33 seconds**.

However, after the journey time messages were removed from the sign, a noticeable change occurred. Between **November 2024 and June 2025,** the average journey time increased to **25 minutes and 7 seconds.**

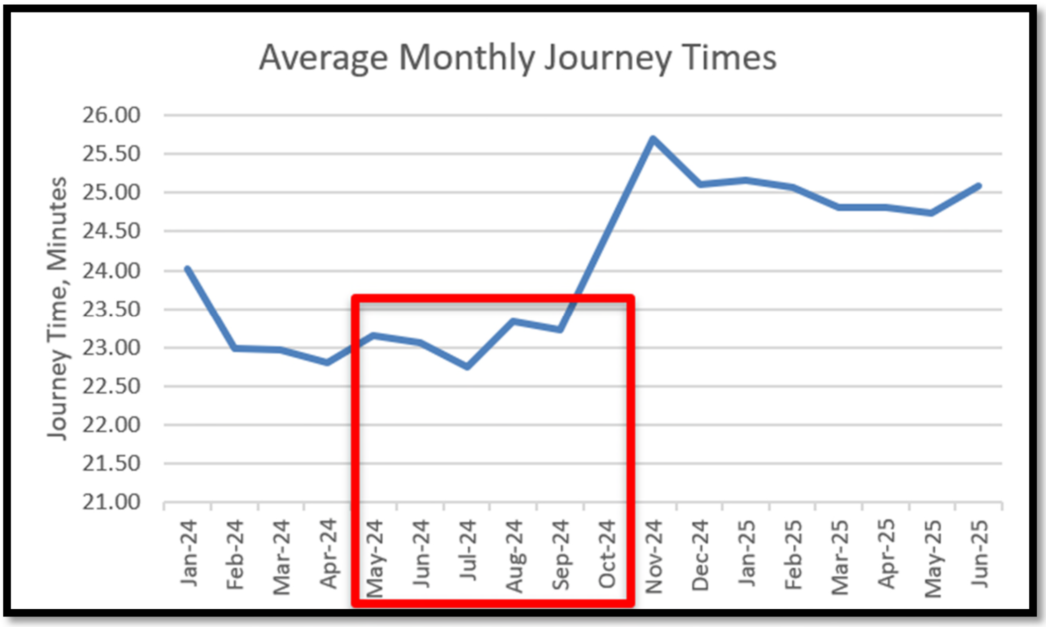

Figure 7: Graph showing average monthly journey times during using VMS messaging

While several factors may have contributed to this increase—including seasonal roadworks, slower vehicles, and winter-related incidents—driver behaviour is also a likely influence. Without access to the journey time data, drivers were less able to assess congestion levels and may have unknowingly contributed to increased traffic density on the main route.

How the data flow can be used with system integration

The journey time data in this case was sourced from Causeway One Network, a subscription-based provider already in use by the council.

The data was integrated into the SWARCO MyCity platform, which is designed to be supplier-agnostic and compatible with multiple data sources, including:

- TomTom
- Causeway One Network
- National Highways NTIS
- Senseview

The MyCity platform processes the following data points:

- Latest journey time
- Average speed
- Timestamp of the last API update

This information is then used to dynamically update VMS displays. While the core message on the sign remains fixed, the journey time value is updated in real time based on the incoming data.

Case Study 2 conclusion

This case study suggests that when drivers are informed of longer-than-expected travel times, they are more likely to consider alternative routes. By contrast, the absence of such data may lead to uninformed decisions, resulting in higher congestion and longer travel times.

Providing journey time data at strategic points—such as the start of a major route—enables drivers to make proactive choices. This not only improves individual journey efficiency but also contributes to better traffic distribution across the network.

Case Study 3: Multi-Source Data Integration for Proactive Traffic Management

In increasingly complex urban environments, the integration of multiple data sources offers a powerful approach to managing congestion and improving air quality.

The case study for, council B provides a compelling example of how combining real-time data from various systems can support more strategic and responsive traffic management.

In the area surrounding the Black Country Millennium Forest, Council B has deployed a suite of sensors and systems that continuously collect and analyse data from three key sources:

- **Air Quality Monitoring**: Sensor WVR006 measures nitrogen dioxide (NO_2) levels, a pollutant primarily produced by vehicle emissions. Elevated NO_2 levels are often associated with high traffic volumes and pose risks to both public health and the environment.

- **Journey Time Monitoring**: A journey time link on the A4150 Ring Road (St Marks, southbound) uses Senseview sensors to track travel times and detect congestion in real time.

- **Car Park Occupancy**: Fold Street Car Park is equipped with a SWARCO Smart Camera that monitor vehicle entry and exit, providing up-to-date occupancy data.

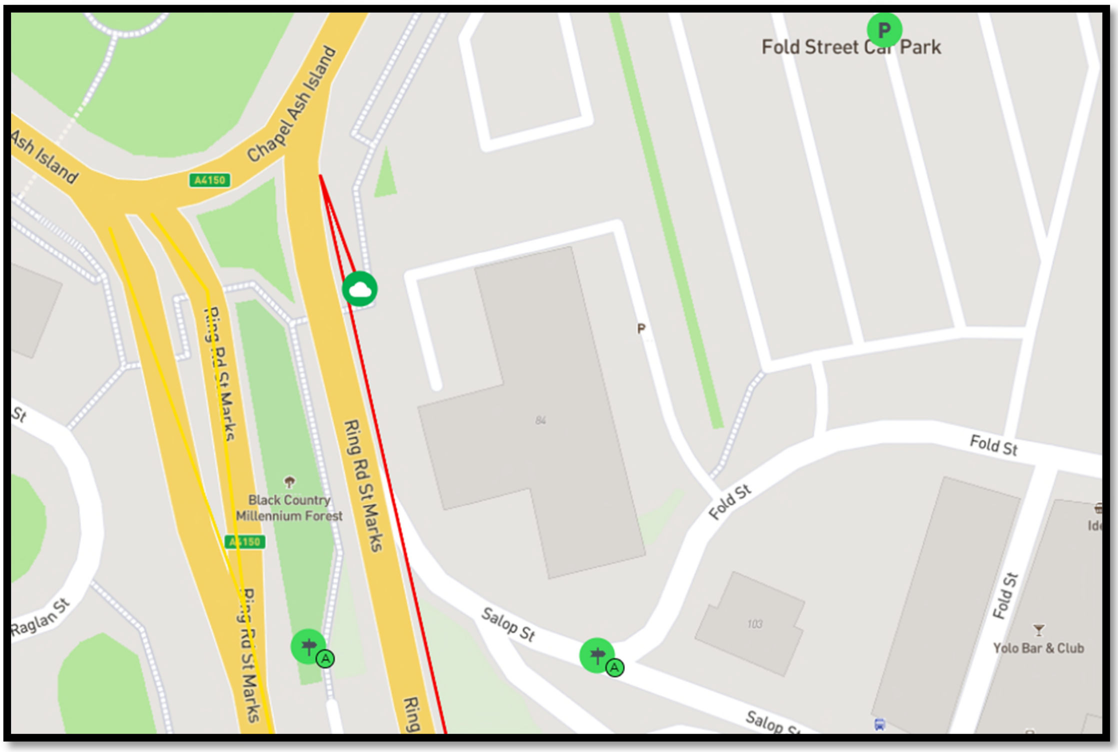

Figure 8: Map view for council B containing multiple assets

Data-Driven Strategy in Action

By integrating these data streams into a unified strategy, council B can proactively manage traffic flow and reduce congestion.

For example, when the system detects that:
- NO_2 levels are rising,
- Journey times are increasing on the A4150,
- And Fold Street Car Park is nearing full capacity,

…a coordinated response can be triggered.

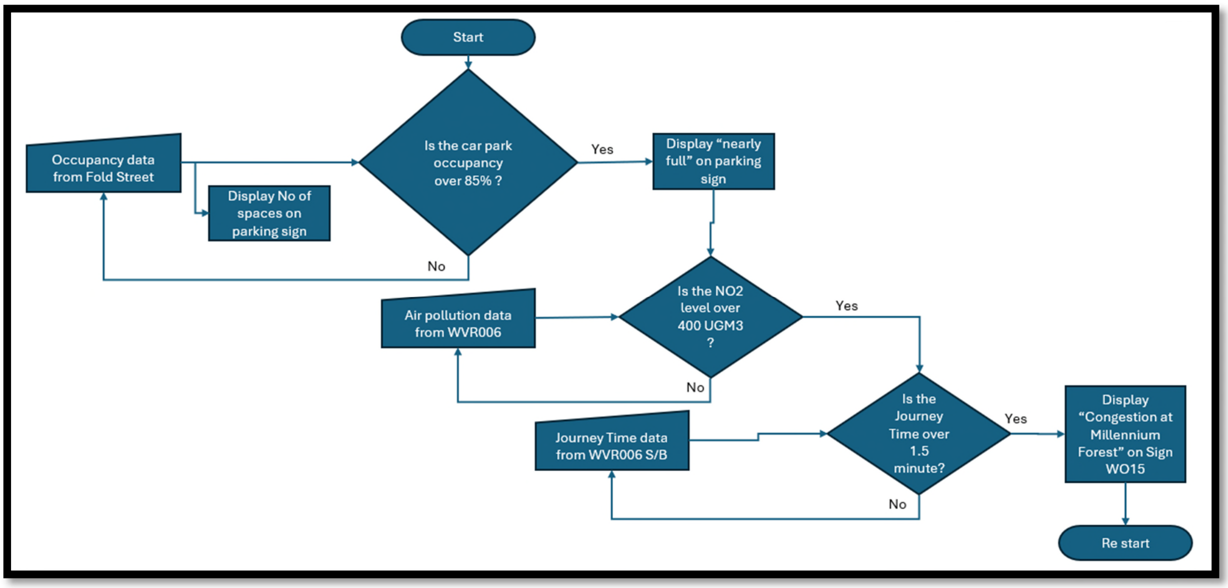

Figure 9: Sample strategy using data input

This may include displaying messages on upstream VMS signs along the A434, advising drivers to divert before reaching the congested area.

Case Study 3 conclusion

With this strategy in place, drivers can receive the information a lot further back the A434 and can make a decision if they would like to continue to the Black Country Millennium Forest area or if they should divert to the north or the south of the city instead, then they do not become part of the congestion in that area. Without this information being provided to them drivers cannot make these decisions and help to reduce congestion on the travel network.

This case study illustrates the value of cross-referencing environmental, traffic, and parking data to inform both drivers and traffic managers. By delivering timely, location-specific information, councils can:

- Alleviate pressure on overburdened areas,
- Improve air quality through reduced idling and stop-start traffic,
- And enhance the overall efficiency of the road network.

Without access to this integrated data, drivers would be unaware of the developing conditions and unable to adjust their routes accordingly—leading to avoidable congestion and environmental impact.

Conclusion

These case studies clearly demonstrate the transformative potential of real-time data in shaping driver behaviour and improving the efficiency of urban transport networks.

While not all drivers will respond to data—some may continue to follow navigation systems or habitual routes—**a significant portion will adjust their behaviour when presented with reliable, actionable information**.

Across all examples, a consistent theme emerges: **when drivers are equipped with timely, relevant, and localised information, they are more likely to make decisions that benefit both themselves and the wider network**.

These findings reinforce the importance of continued investment in data infrastructure, integration platforms like SWARCO MyCity, and the strategic use of Variable Message Signs. By leveraging the data already available to them, local authorities can take meaningful steps toward smarter, more sustainable mobility.

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