Highways England and Local Authority

Data Discovery

March 2020

EY
Building a better
working world

REPORT

NDEX

EXECUTIVE SUMMARY

Over the course of this engagement, we engaged with a total of

95

stakeholders across

41

organisations to understand their pain points.

The DfT's Local Transport Data Discovery, published in September 2018, was undertaken to assess the maturity and value of open local authority transport data. The need for greater cross-boundary data co-operation, and specifically for Highways England and local authority collaboration, was one of the key recommendations.

In November 2019, the Department for Transport (DfT) and Highways England jointly commissioned EY to undertake a 10-week discovery project to understand the barriers that exist around collaboration, communication and data sharing between Highways England and local highway authorities. The discovery has focused on the user needs and the pain points between these organisations – as well as third parties and users – when managing and maintaining England's road network. Over the course of this engagement, the team engaged with a total of 95 stakeholders across 41 organisations to understand their perspectives.

The discovery has also focused on data exchange between the road networks and the practical steps to deliver a better operational relationship through digitisation and sharing standardised data – a critical step to enabling the future of mobility. By taking a more joined up approach to data management, procurement and investments, the organisations can collectively improve traffic and incident management, moving towards "one road network" and improving journeys for road users across the country.

The key findings from this data exchange discovery are as follows:

- A lack of data exchange and system integration, between the two road networks, is resulting in sub-optimum network management and lack of co-ordination particularly with regards to incident management.

- Opening up and sharing data (planned activities, real-time data, control measures employed etc.) and systems must be improved so that a holistic approach can be taken to network management and towards system-to-system data exchange.

- There are exemplar models of both data exchange and system integration across the networks, but these are mostly isolated and there is limited national perspective.

- Stakeholders regularly do not know who to contact within different organisations and communication channels and processes are not well defined (with communications often being reactive, rather than proactive).

- Communication channels are not formalised nationally and, where in place, tend to be ad-hoc and either generated by individuals or schemes.

- There is no consistent data management framework in place that has established common principles, policies and standards for data exchange between highway authorities. This has resulted in different levels of data maturity and different levels of data quality between organisations.

- Leadership is required from the Department for Transport to support national policy and guidance that is designed to foster better co-ordination and establish best practice.

- The existing communication channels with customers are often ineffective, with the different highway authorities often communicating with customers in isolation.

- There is a lack of collaboration between different highway authorities when closing roads.

- Existing data is refreshed at different rates by different organisations, providing no consistent data capture processes across the industry.

- Real-time data is essential for traffic management – currently highway authorities often make traffic decisions using historic, rather than live, data.

- The different highway authorities use a wide range of legacy systems resulting in contractual obligations with different suppliers.

- Third parties (such as satellite navigation companies) add an extra layer of complexity for highway authorities when managing local traffic levels. These third parties often divert customers in-journey by using their own algorithms, with no integration or collaboration with the different highway authorities.

- Increasing digitalisation, and connectivity/sensor data, is both an opportunity and challenge. Developed in isolation, these new systems and data mechanisms are likely to reinforce the siloed operations.

Considering these findings, the recommendations within this discovery are grouped into four themes:

BETTER COMMUNICATION FOR MANAGING 'ONE ROAD NETWORK'

Highway authorities should establish more formal communication layers for different traffic management services, whilst also strengthening operational communication channels to support traffic management across the industry. These communication activities should be supported by a review of existing customer communication channels, whilst organisations should also work to remove any existing silos when communicating with road users on the network.

GREATER COLLABORATION TO UNLOCK BETTER SERVICES

The DfT Local Transport Data Discovery report recognised the disparate policies and objectives for each of the 150 plus highway authorities in England. The Department for Transport should take a more proactive role and consider the appropriate framework for establishing better communication, co-ordination and investment. This could also include the provision of guidance and consideration of the Traffic Manager role in improving collaboration within the current legislative framework ('the Network Management Duty' established in the Traffic Management Act 2004), and the scaling of appropriate existing programmes to improve collaboration and services.

DESIGNING DATA FRAMEWORKS FOR INTEGRATION

Interoperability, integration and potential predicative capability is dependent on the relative data maturity and systems of the highway authorities. A more detailed data health check of highway authorities should be undertaken to establish a baseline and support the establishment of a common data framework. This framework will be a considerable task and will need to be designed to establish common principles, policies and standards for data exchange between the different organisations which will support greater system-to-system operations. Creating a national data framework will enable the different organisations to design data services that consider the requirements of all highway authorities.

CO-ORDINATE INITIATIVES FOR THE DIGITISATION OF THE HIGHWAY

Local highway authorities and Highways England will need to collaborate towards the development of the digital road network. The Department for Transport is currently leading on the development of a national data model for Traffic Regulation Orders (TROs), but all communications and Traffic Management Plans should also be reviewed and digitised where possible.

INTRODUCTION TO REPORT

2.

2.1. Objectives of the Discovery

One of the recommendations of the DfT's Local Transport Data Discovery report was to improve collaboration and data sharing between Highways England's Strategic Road Network (SRN) and the local authority road network, recognising its importance to improving operational performance and enabling a more connected road network.

This discovery was commissioned to explore the current user needs and pain points between Highways England and local highway authorities when exchanging data necessary for delivering traffic and incident management services on the respective road networks. In doing so, the discovery was cognisant of existing programmes designed to improve co-ordination between the two networks. Highways England's Collaborative Traffic Management (CTM) programme is establishing processes, technology and capabilities that enable the different highway authorities to control network assets to optimise network performance, whilst also understanding broader network trends[1]. For example, the CTM programme integrates operating systems at the network interfaces and is already delivering benefits from system and data integration which delivers the following objectives for the network operators and the road user:

▶ Smoother traffic flows across the whole road network

▶ Enhanced network management capability - including events and work planning and incident management

▶ Proactive reduction of congestion at hotspots

▶ High quality information for customers and partners

▶ Enhanced strategic planning capability

▶ More collaborative ways of working with stakeholders

▶ Greater business benefits from existing and future term contracts

1   Operational Technology Group Context Paper, UTMC, UTC, CHARM and CTM, Highways England, July 2019

Ultimately, the focus of the discovery is to encourage cross-boundary working to improve the end-to-end journey for the user. In this context, the hypothesis to be tested by the discovery was set out in the specification, highlighted right.

To address this hypothesis, we have captured the existing pain points experienced across the sector and outlined a series of recommendations to address these barriers, whilst also considering how to support wider initiatives such as de-carbonisation; improving air quality and driving efficiency. These project outputs will also support the wider industry objective of providing a better journey experience for road users, whilst also setting the foundations for a digitally connected infrastructure of the future.

From a technology perspective, the emergence of Connected and Autonomous Vehicles (CAV) will impact the data requirements and amount of data that can be exchanged via two-way processes between vehicles and traffic management services. It is important for the discovery to establish the right data management foundations across the industry, as this will enable the different organisations to leverage the future capabilities of CAV and other technologies, such as artificial intelligence and machine learning.

These objectives are consistent with the factors driving the development of the Department's draft Transport Data Strategy and action plan: the pace of change; the need to ensure that people and places are not left behind in the development of improved services; the need to ensure data is available and connected to support the aim of decarbonisation; the need to make sure the appropriate data infrastructure and skills are in place to support the Future of Mobility[2]; and that data is used securely and ethically to build and maintain trust with customers and stakeholders.

2.2. Context of the discovery

In 2018, a Local Transport Data Discovery was commissioned by the Department for Transport 'to identify the opportunities and challenges for key user groups to maximise the benefits of local authority transport data across England'[3]. It recommended 'the need for improved transport data across Highways England and local authorities'[4] and establishing a 'review and refresh of communication channels and ways of working'[5] between Highways England and local authorities, which served as the catalyst for this discovery and subsequent report.

There are five key policy owners or interested parties to be represented within this discovery:

1) THE DEPARTMENT FOR TRANSPORT

This discovery is one of the last actions the Department commissioned to achieve its Local Transport Data Plan – a series of responses and actions in response to the recommendations from the DfT's Local Transport Data Discovery Report. The Department has partnered with Highways England to find and manage the discovery.

The Department is responsible for the Traffic Management Act 2004 which establishes and defines a need for improved network management. The Network Management Duty (NMD) requires local authorities to keep traffic flowing and to co-operate with other highway authorities (including Highways England) to achieve this. All traffic authorities are required to appoint a Traffic Manager in order to deliver all aspects of network management.

'Local Highway Authorities are the highway authority for most of the local road network and Highways England for the Strategic Road Network. A lack of data exchange and system integration, between the two networks, leads to sub-optimum network management and a lack of co-ordination particularly with regards to incident management.'

---

2   Future of Mobility: Urban Strategy, Department for Transport, March 2019
3   Local Transport Data Discovery, Department for Transport, 2018, p6
4   Ibid. p35
5   Ibid.

Section 16 of the Traffic Management Act provides:

'It is the duty of a local traffic authority to manage their road network with a view to achieving, so far as may be reasonably practicable having regard to their other obligations, policies and objectives, the following objectives:

(a) securing the expeditious movement of traffic on the authority's road network

(b) facilitating the expeditious movement of traffic on road networks for which another authority is the traffic authority.'[6]

Further, section 18 of the Act enables the Department to 'publish guidance to network management authorities about the techniques of network management or any other matter relating to the performance of the duties imposed'[7] and, 'in performing those duties a network management authority shall have regard to any such guidance.'[8] In extremis, there are powers for the Secretary of State to intervene and the Department has provided guidance to these powers.

Oversight and monitoring of these powers has been managed by the sector to encourage ownership. The National Traffic Managers Forum, managed by ADEPT, provides a platform to discuss current and future issues in delivering a safe, sustainable highways network and is attended by local authority regional Traffic Managers and Highways England.

2) HIGHWAYS ENGLAND

The Strategic Road Network comprises approximately 4,300 miles of motorways and major 'trunk' A-roads in England, and it is managed by Highways England, a company wholly owned by the Secretary of State for Transport. The governance framework for Highways England comprises legislation, a licence document, a Framework Agreement, a Road Investment Strategy and Articles of Association, supported by relevant guidance and standards. This was legislated for in the Infrastructure Act 2015.

Highways England is currently concluding Road Investment Strategy 1 (RIS1), which is its current five-year investment strategy. RIS2 is due to start in April 2020, with the government providing a budget exceeding £27bn from 2020-25[9]. RIS2 will be more directed to user priorities, focusing more on the overall operation of the SRN, better information services and more co-ordinated diversion routes when responding to incidents on the SRN.

Across the entire road network including strategic and local roads, road user journey times are getting worse: 'in 2018, the average delay on the Strategic Road Network (SRN) was estimated to be 9.4 seconds per vehicle per mile. This is an increase of 0.4 seconds per vehicle per mile (3.9% increase) on the previous year'[10]. Both Highways England and local authorities are experiencing increased pressure to deliver improvements to traffic management services. No journey starts or ends on the SRN, so Highways England recognises the importance of working with local authorities in delivering their purpose of ''connecting England through better journeys.''

The Information Vision & Strategy, developed with EY, outlines the ambition of Highways England to become a data driven company. By providing information that can be trusted and valued by all, their vision is to build trust with suppliers, stakeholders and customers. It sets out a transformation journey and roadmap of data-enabled initiatives that will deliver organisational and strategic objectives for RIS2 and beyond, as well as significant financial benefits for the company and economic benefits for UK society. This work – as well as other Highways England initiatives – are referenced in this report as examples of data sharing initiatives that have the potential to scale into industry-wide solutions.

....
6   http://www.legislation.gov.uk/ukpga/2004/18/section/16
7   http://www.legislation.gov.uk/ukpga/2004/18/section/18
8   Ibid.
9   https://www.gov.uk/government/publications/budget-2020-documents/budget-2020
10 Department for Transport, Transport Statistics Great Britain 2019, p16

For example, Highways England provides Regional Control Centres (RCCs) as the focal point for all communications regarding planned and unplanned events, such as incidents and emergencies, on the SRN. RCCs gather and assess regional network information and deploy and co-ordinate resources to manage both the network and criminality. RCCs manage and monitor traffic and control Variable Message Signs (VMS) in conjunction with the National Traffic Information Service (NTIS).

From an operations perspective, Highways England is working with local authorities in the South East whilst implementing the Common Highways Agency Rijkswaterstaat Model (CHARM) Programme and is also working with local authorities in the South East and the North East to develop the Collaborative Traffic Management (CTM) Programme. Both programmes are covered in more detail elsewhere in this report.

3) LOCAL HIGHWAY AUTHORITIES

Data is a critical resource for enabling more efficient and effective local authority traffic and transport services. Opening up this data and removing barriers to effective data use across the public and private sector needs to be a priority as we look to evolve and improve transport services. However, the DfT's Local Transport Data Discovery report concluded that the sharing and use of local authority transport data across England is currently limited and their data maturity is low.

There are over 150 local authorities in England with responsibility for managing their road networks. By its nature, this provides for diverse policy drivers and difficulty in both developing national communication and co-ordination. Direct road network interface between Highways England and local authority highway operators is also highly variable – more than 30 London boroughs have limited or no interaction with Highways England. Where there is interaction, this is largely dependent on the relative size, geography and interfaces and/or direct impact with the SRN.

The level of system and data exchange is also dependent on the data and system maturity of the local authority. Many local authorities do operate traffic control centres, capable of some communication with the RCCs, but their provision and resourcing is also highly variable.

From a local government perspective, devolution is becoming increasingly prominent at both a local and national level. With different regions having different priorities and objectives for their local areas, devolution will provide an opportunity to integrate both services and systems and align investment opportunities across the wider transport community.

From a financial perspective, austerity has made its mark on many local authorities, with organisations protecting their own local service delivery, leading to silos of information and decision-making. Austerity has also meant that many of the key staff who had the detailed knowledge and required skills to manage their networks have not been replaced. However, new technologies and graduate entry with new digital skills – especially when coupled with innovative ideas and different attitudes – can provide a great opportunity for increased collaboration between organisations.

4) ROAD USERS

Road users do not generally view the road network as divided between local authorities. They use the network as a whole, irrespective of who is responsible. More reliable journeys are highly valued by road users and are beneficial to the economy. Better integration of the networks should ensure that disruptions are kept to a minimum irrespective of which network the user is travelling on.

5) DATA SERVICE PROVIDERS

Data service providers (such as satellite navigation companies) provide direct interaction with road users (for example, providing route options and journey updates for their customers). Although these providers can receive traffic

"

The Mayor of London and the rest of the UK are united in this call for devolution…so that towns, cities and regions can decide their own investments and spending priorities."[11]

11 'London and the UK: A Declaration of Interdependence', Greater London Authority, 2019, p43

information from local authorities and Highways England, this process is not consistent and highway authorities are unaware of the information that these data service providers communicate to road users. Furthermore, individual data service providers are unwilling to share their specific algorithms with the wider industry (so that they maintain commercial interests and any competitive advantages in the market).

2.3. Overview of the discovery

During this ten-week engagement, we engaged a total of 41 different organisations across the DfT, Highways England, local authorities and third-party companies. The primary purpose of this stakeholder engagement was to create an understanding of the organisations' key pain points when collaborating, communicating and sharing data. During this engagement, we also leveraged existing communication channels – such as the Transport Technology Forum, the Transport Data Initiative and the National Traffic Management Forum – to reach a wider audience.

Coupled with this stakeholder engagement, we also developed two separate assessments. Firstly, we created a data maturity assessment which was influenced by the Data Management Body of Knowledge (DMBOK2) Data Management framework methodology. This assessment provided useful insights regarding existing data processes and levels of data maturity across the industry.
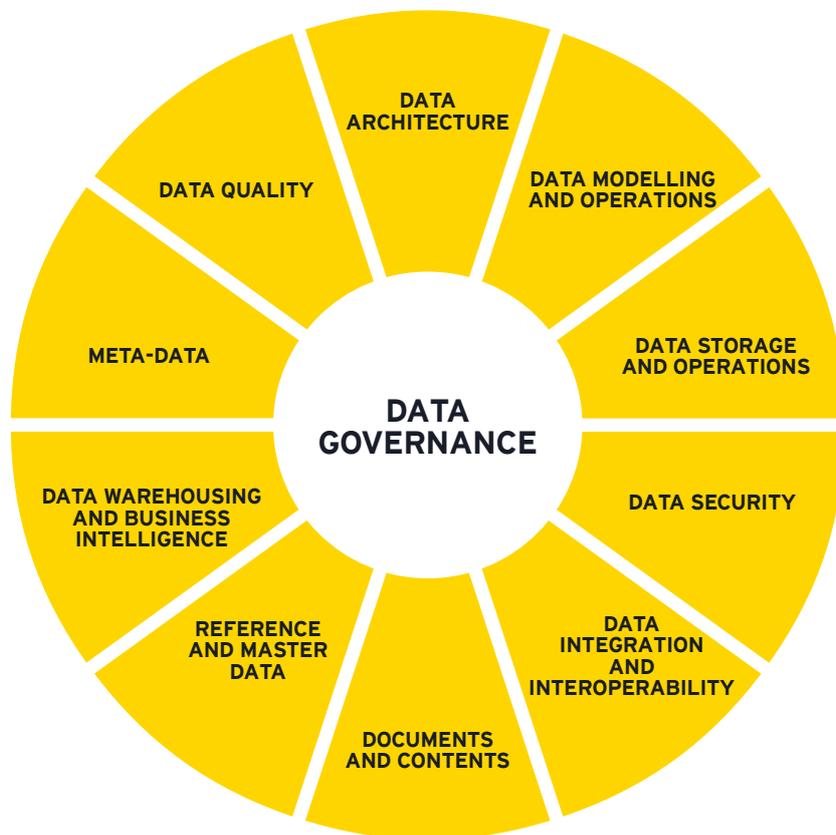
The DAMA-DMBOK2 Guide knowledge area wheel

Secondly, we used a broader pain point assessment, enabling us to engage with more stakeholders and understand a wider set of existing pain points regarding traffic management and the operation of the network. Both surveys, coupled with our stakeholder engagement, provided quantitative data and qualitative information regarding the challenges that the different organisations face when trying to work collaboratively to deliver traffic management solutions.

Having captured a wide range of existing pain points and opportunities from our stakeholder engagement, we identified Traffic Management and Customer Re-Routing as two key areas which encapsulate the current challenges, processes and opportunities experienced across the industry. We held digital workshops to deep dive into these specific areas. These are covered in more detail in Section 4 of this report.

3.
USER PAIN
POINTS

As part of this discovery, we engaged multiple stakeholders across the industry to understand the existing pain points that are currently experienced when attempting to work collaboratively whilst managing and maintaining the road network. These pain points are split into the following themes:

1.	2.	3.	4.
Communication	Collaboration	Data and systems	Co-ordination

These themes provide a comprehensive overview of the current pain points the wider industry is experiencing and provide context for our recommendations detailed in this report.

3.1   Communication

OPERATORS DON'T KNOW WHO TO COMMUNICATE WITH BETWEEN THE ROAD NETWORKS

There are not strong networks between organisations when managing their respective road networks. Often, people don't know who to contact, or their contact details, when trying to work collaboratively. There are isolated examples where people do know who to contact; however, this is usually because these individuals have been in role for several years and have gradually built relationships at a local level. Generally, the recurring pain point was that individuals within different organisations did not know who to speak to across the industry, or how to contact them effectively.

> " We never really built a relationship with Highways England. We don't even have a number to call when there is traffic causing a back log."

Traffic and Network Manager, local authority

> " I find it difficult to communicate... It depends on who you know and it's hard to be known as a small Local Authority."

Traffic Control Service, local authority

> " If I could change one thing to resolve the issues that I currently experience when collaborating with local authorities and third parties, it would be communication."

Advisor, Highways England

THERE ARE LIMITED ESTABLISHED COMMUNICATION CHANNELS ACROSS THE INDUSTRY

There are limited confirmed communication channels used across the industry. Some organisations rely on telephone calls and some rely on emails for certain scenarios. Confirmed communication channels have not been established for specific situations, which means that there are no consistent ways of working across the industry. There are examples of established communications that multiple organisations do find useful, such as National Incident Liaison Officers (NILO) emails. However, these NILO alerts are national emails and often result in organisations receiving multiple notifications about incidents that do not apply to their section of the road network, thereby reducing the effectiveness of these communications.

> " There are no established two-way communication processes between us and Highways England, I just rely on my network and know who to contact locally."

Traffic Manager, local authority

58%

of survey respondents would prioritise changing communication processes between highway authorities to resolve the issues that they currently experience.

THERE ARE NO STANDARD COMMUNICATION PROCESSES ACROSS THE INDUSTRY

There is a lack of confirmed communication processes within the industry. There are limited industry SLA's for communication, and limited established communication processes, which often results in different organisations being told retrospectively of traffic management plans that have been implemented at a national or local level. This results in organisations not communicating effectively, if at all, when trying to work collaboratively to manage their road networks.

> " Contacting local authorities has been a long-standing issue. It is painful. A lot of the time we don't even get a reply. We email and call... There is no process in place to make sure that communication does happen. It's very ad-hoc."

Resource Specialist, sat nav company

COMMUNICATIONS BETWEEN THE ROAD NETWORKS ARE OFTEN REACTIVE

Communications between organisations are often reactive, with no foresight or prescribed communication strategies. Such reactive ways of working mean that the different organisations are not able to fully comply with the regulations specified within the 2004 Traffic Management Act, such as to 'identify things (including future occurrences) which are causing, or which have the potential to cause, road congestion or other disruption to the movement of traffic on their road network'[12]. This has been recognised by Highways England, who are currently transitioning their existing Route Control Centres (RCCs) to Regionals Operations Centres (ROCs), 'shifting away from reactive incident management to proactive operation of the network'[13].

> **"**
>
> We often get a call from a member of public when an incident has occurred on the network. We would then give Highways England RCC a ring. It is a reactive response."
>
> **Traffic Manager, local authority**

"ONE ROAD NETWORK" COMMUNICATIONS WITH CUSTOMERS ARE NOT COHERENT

Existing communication channels with customers are ineffective. Organisations are often limited to leveraging existing social media channels (such as Twitter); updating local websites; notifications from media outlets; and using roadside signs and VMS to communicate the latest messages on the different road networks. However, customers do not regularly check the latest traffic information before starting their journeys, whilst they also often ignore the messages provided on the network from the different organisations (preferring to follow journeys as instructed by their satellite navigation provider).

> **"**
>
> The challenge when communicating with customers is that people are focusing on their journeys, so they are not able to absorb a lot of information. This is further compounded with people often ignoring messages on VMS (such as recommended temporary speed restrictions), leading to bottle-necks of traffic on the road network."
>
> **Major Roads Director, sub national transport body**

....

12 http://www.legislation.gov.uk/ukpga/2004/18/section/17
13 Operational Technology Group Context Paper, Highways England, 04/07/19

3.2 Collaboration

CONFLICTING POLICY DRIVERS FOR BOTH ROAD NETWORKS

The different organisations have different priorities and objectives regarding their road networks. Highways England focus on their customers on the SRN, whist local authorities focus on their customers on the local road network. Not only is there no holistic view (or common strategic aim) across the sector, but at their crux, the different organisations have contrasting strategic objectives. To improve collaboration across the industry, each of these companies need to think beyond the specific road networks that they manage and maintain.

> **"**
>
> Highways England and local authorities have different strategic aims. Highways England want to get traffic off the SRN as quickly as possible and local authorities don't want traffic in their cities. They want to get traffic out of cities and off their roads as quickly as possible. The difficulty is how do you balance these contrasting strategic objectives?"
>
> **Director of Network Management**

THERE IS A LACK OF COLLABORATION BETWEEN THE RESPECTIVE ORGANISATIONS WHEN MANAGING DIVERSIONS AND CLOSURES

There is frustration regarding the lack of collaboration between organisations when closing roads on the network. Although there are existing systems (such as Elgin's one.network, which is used by 95% of local authorities) there are no programmes that display all planned and unplanned road closures geospatially across the entire road network. The biggest challenge is that some of the private sector solutions do not receive information from Highways England (and therefore do not display a national view of all roadworks and road closures). Implementing diversion routes can have a significant impact on local traffic levels, whilst also affecting network capacity, freight company performance and local air quality levels (especially if many vehicles are diverted from the SRN onto local road networks at short notice).

The deployment of the DfT's Street Manager will address this current pain point. Street Manager, a regulatory and digital planning service, will make more consistent, accurate data on street works available to all highway authorities and motorists. Unlike current data on roadworks which is often out of date and incomplete, Street Manager will generate real-time data and will be free for technology companies and app developers to use. This will allow existing apps and providers, such as Waze and Google maps, to enhance their services making them even more accurate and allowing other firms to create new products to help drivers avoid traffic jams.

There is also a lack of collaboration between different highway authorities when managing diversion routes on different road networks due to incidents or emergencies. Without a holistic view of all incidents and active roadworks impacting their road networks, many of the highway authorities reported that they regularly experience difficulties when attempting to implement co-ordinated diversion routes for their customers.

> **Local Authorities put works on diversion routes that we are not aware of. There is no national view of road works and how it impacts traffic."**
>
> **Customer Experience, Highways England**

> **You can encounter several lengthy diversions across several motorways. Local Authorities only look at their own region, not the previous or next region that the vehicle is going through."**
>
> **Customer Experience, Highways England**

> **I am not regularly kept informed of the studies and schemes Highways England is undertaking on its network through our district – sometimes I only find out about their studies and plans by chance."**
>
> **Traffic Management and Network Manager, local authority**

WITH EXCEPTIONS, ISSUES FOR MANAGING TRAFFIC AT THE INTERFACE BETWEEN THE NETWORKS

There is fundamentally a lack of collaboration across the industry when managing traffic at the interface between the SRN and the local road network. Most highway authorities do not work with Highways England to optimise network performance, plan road closures, or to identify incidents that might result in temporary spikes in local traffic levels. Furthermore, as each organisation uses different traffic management systems to control their individual network assets (such as traffic signals and VMS signs), effective collaboration becomes increasingly difficult across the industry as the required processes and tools are not in place.

> **We need more joined up working, particularly on innovation; data sharing; and collaboration on improving networks where both organisations have responsibility and can impact efficiency."**
>
> **ITS Engineer, local authority**

CURRENT FORUMS TO ENCOURAGE COLLABORATION NEED TO BE STRENGTHENED

Another point was regarding the effectiveness of existing forums in encouraging collaboration. These forums have been successful in creating a platform for discussions and have delivered good examples of joint working and collaboration. However, they are essentially forums for discussion and may not have the accountability or the influence for instilling change at a national level.

> **There are regional traffic manager forums as part of the 2004 Traffic Management Act. However, the engagement is not at a level that it should be to benefit the customer."**
>
> **Customer Experience, Highways England**

COLLABORATION IS AFFECTED BY DIFFERENT WORKING PRACTISES

The different organisations have different contractual working hours. Highways England's RCCs are staffed 24 hours a day seven days a week, whereas local authorities usually maintain regular office hours. Therefore, if an incident happens on the SRN outside regular office hours, Highways England often cannot contact the local authority to 'facilitate the expeditious movement of traffic on road networks for which another authority is the traffic authority'[14]. This means that decisions to manage the network are often made in isolation with limited collaboration between organisations.

> ❝
>
> It can be very difficult to work with local authorities as they have different working hours to our RCC. Incidents can happen on the SRN outside regular office hours that will have an impact on the local road network, but we can't contact the local authority as they are not in the office."
>
> **Network Manager, Highways England**

LIMITED COLLABORATION BETWEEN THE DIFFERENT ORGANISATIONS WHEN SHARING TRO DATA

Another pain point was the existing process regarding Traffic Regulation Orders (TROs). TROs provide the legal framework for making changes (speed restrictions, pedestrian management and road closures etc). Currently, local authorities publish these TROs via various channels, such as local newspapers and on websites. However, the lack of a consistent TRO process is a pain point for third parties, who then must allocate significant resource to identify, collate and replicate these TROs onto their mapping systems.

> ❝
>
> There is no central repository for TRO's and this is a crucial pain point."
>
> **Content Acquisition Manager, satellite navigation company**

3.3   Data and Systems

58%

of survey respondents do not have a standard definition for the datasets that they regularly use.

LACK OF CONSISTENT DATA MANAGEMENT FRAMEWORKS

The numerous established data standards for traffic management were identified as a significant pain point. The lack of consistency for all organisations regarding data capture, data management, data storage and data sharing is a major blockage to collaboration and data sharing. With no national technical framework in place, it is difficult for the different organisations to work collaboratively as they have different data strategies and adhere to different data standards.

> ❝
>
> The Department for Transport have set a legal framework, but we need to specify a technical framework, or we're doomed to fragmentation."
>
> **Collaborative Traffic Management Project Co-Sponsor, Highways England**

> ❝
>
> For speed restriction data, we had to reach out to each borough separately and the format varied immensely. Text data on some days, emails or pdf on other days. Within the same cities itself, the data comes in different formats."
>
> **Third Party Supplier**

14 http://www.legislation.gov.uk/ukpga/2004/18/section/16

DIFFERENT LEVELS OF DATA MATURITY BETWEEN ORGANISATIONS

There are different levels of existing data maturity between organisations. One of the main reasons for these different levels of data maturity is the differing financial resources. This broad range of existing data management processes for different local authorities means that there is vast range of data maturity across the industry.

> **"**
>
> My biggest challenge with managing data is that there are too many sources of data, differing terminology and classifications."
>
> **Highways England stakeholder**

DATA IS REFRESHED AT DIFFERENT RATES BY DIFFERENT ORGANISATIONS

A recurring theme articulated by stakeholders through the discovery was the infrequency of data updates by all partners. Often information is refreshed inconsistently and is not shared frequently enough between the different organisations, which means that they are not able to make effective decisions to manage their local road network with the data that they receive. This reduces the benefits of data sharing, as the different organisations are not convinced in both the age and the accuracy of the data they receive from their different counterparts.

> **"**
>
> One of my biggest issues when receiving information from different organisations is that the information I do receive is often out of date very quickly."
>
> **Key Route Network Manager, sub-national transport body**

LACK OF REAL-TIME DATA FOR TRAFFIC MANAGEMENT

Stakeholders also identified the lack of real-time data for ongoing traffic management as a blocker towards effective network management. Often, the different authorities will have to respond to incidents on the SRN or local road network but are expected to do so without access to comprehensive real-time data. Having access to incomplete or out-of-date data limits their abilities to identify the best solutions when responding to incidents, or to implement the most effective traffic management responses for customers on the road network.

> **"**
>
> We do not receive volume, speed or headway data in real time on critical parts of the network. These datasets would be useful if INRIX are able to provide these."
>
> **UTMC Manager, local authority**

65%
of survey respondents have difficulty managing their data.

Only
29%
of the highway authorities surveyed currently have access to real-time traffic data.

94%

of survey respondents agreed that there are opportunities to use data more effectively or efficiently between Highways England, local authorities and third parties.

DATA IS NOT SHARED EFFECTIVELY BETWEEN HIGHWAYS ENGLAND AND LOCAL AUTHORITIES

Individuals highlighted that although enough data is currently captured between the different organisations, the primary problem is that this data is not shared effectively or efficiently between these companies. There are often multiple silos (both within individual organisations and between different highway authorities) and there are no efficient processes in place to effectively share data between the respective networks.

"

We already capture enough data across the industry. The main problem that we need to address here is that we do not share data effectively between the different companies."

Key Route Network Manager, sub-national transport body

41%

of survey respondents do not know how frequently their data is used.

DATA THAT IS SHARED NEEDS TO BE EFFECTIVE

When data is shared between organisations it is often as a large data dump that contains an incredibly large amount of structured data. The different organisations then need to spend time and allocate resources to process this data, so that they can find the important information that they require to effectively manage their road network. However, it is both expensive and time-consuming to process data on such a regular basis – especially when local authorities are already often resource constrained.

"

When I do receive data from Highways England or other suppliers, it's often vast and I don't need all of the information provided. This makes it difficult to identify the works that will cause a severe impact on my local network."

Traffic Manager, local authority

WIDE RANGE OF SYSTEMS USED ACROSS THE INDUSTRY WHICH ARE NOT INTEROPERABLE

There are a wide range of systems that are used across the industry to fulfil similar purposes which are not interoperable. For example, the Urban Traffic Management and Control (UTMC) System, the most common traffic management operating system adopted by highway authorities, is provided by four different suppliers which pose significant interoperability issues for users. These systems store data and aggregate functions from multiple Intelligent Transport Systems (ITS), such as VMS signs, car park systems, junction systems and traffic signals. This enables Traffic Managers to co-ordinate and set traffic strategies across multiple technologies. However, each of these UTMC systems – which are provided by different suppliers – have different user interfaces and ways of working, which hinders collaboration.

The differing maturity of existing systems used by highway authorities is also a blocker, as this does not result in a consistent level of user experience across the industry. Meanwhile, the development of multiple geospatial systems across the supply chain further complicates the interface and integration between these organisations. Currently, highway authorities use a range of different geospatial systems to gather information regarding their road network. However, these disparate systems are not linked and do not have a common user interface, which negatively impacts any efforts to improve collaboration between organisations.

> **"**
>
> Interoperability of systems is my biggest issue when sharing data with different organisations."
>
> **ITS Engineer, sub-national transport body**

> **"**
>
> Each UTMC manufacturer has a different flavour of Datex2 formats. This does not cause major issues on the Collaborative Traffic Management (CTM) programme; however, it complicates the linking between UTMC systems."
>
> **Technology Director, consulting services company**

3.4 Co-ordination

SILOED WORKING BETWEEN ORGANISATIONS

From a co-ordination perspective, different stakeholders regularly highlighted the large amount of siloed working between organisations and how this negatively impacts any efforts to co-ordinate activities on the road network. The different organisations do not work together effectively, do not share useful information, and often develop strategies in isolation. With such high levels of siloed working (both within each organisation and across the sector), it becomes increasingly difficult to co-ordinate activities or identify common initiatives that would generate maximum value for the customer as they complete their journeys on the road network.

> **"**
>
> Organisations need to have better communication across the transport industry, instead of carrying out siloed conversations, a more co-ordinated approach needs to be undertaken."
>
> **Major Roads Director, sub national transport body**

SILOED PROCUREMENT PROCESSES ACROSS THE SECTOR

Multiple stakeholders expressed frustration that there is not a joined-up procurement approach. With each of these organisations procuring multiple local systems and data to address operational issues, there is not a co-ordinated procurement process between Highways England and local authorities.

> **"**
>
> There is huge efficiency to be had in a joined-up procurement approach."
>
> **Corporate Lead, local authority**

44%

of survey respondents cited system interoperability as the biggest issue when sharing data between highway authorities.

CONTRACTUAL OBLIGATIONS TO DIFFERENT THIRD PARTIES

From a commercial perspective, multiple stakeholders highlighted that they are subject to contractual obligations with a range of third- party suppliers. Concern was expressed that this may lead to market inertia, with barriers to interoperability not supporting a collaborative environment between these third-party suppliers. Furthermore, it would be commercially prohibitive for the different highway authorities to break their existing contracts with these third-party suppliers.

"

As a local authority, we have a five-year contract signed with Siemens as our UTMC provider. It would be very expensive (and very complicated) to break this contract."

Innovation Lead, local authority

4.
DEEP DIVE
INTRODUCTION

When considering areas for a further deep dive, our aim was to select topics that play a key role in impacting the customer experience when travelling on the road network. Reflecting on the key pain points shared earlier in this report, we considered the challenges that focused on specific services and how collaboration can improve network management across the industry. Furthermore, we considered how we could leverage areas that were already undergoing transformation to encourage co-ordination and collaboration in the sector.

4.1   Deep Dive One: Traffic Management

Joint traffic management is a key issue that impacts both how the different highway authorities work collaboratively to manage traffic levels and shapes the customer experience when on the road network. This issue encapsulates many of the different pain points previously highlighted by our stakeholders, but especially focuses on the different systems that are used to manage local traffic levels and the lack of co-ordination and collaboration between organisations when implementing traffic management strategies.

The experiences of other recent initiatives – such as the creation of a Regional Transport Co-ordination Centre (RTCC) in the West Midlands – can also be leveraged when identifying effective traffic management processes to improve collaboration and co-ordination between different highway authorities.

The issues highlighted below focus purely on the challenges that the different organisations experience when trying to deliver joint traffic management activities.

ORGANISATIONS ONLY CARE ABOUT THEIR OWN NETWORKS AND NOT THE INTERFACE BETWEEN NETWORKS

Joint traffic management continues to be significantly impacted by the different highway authorities not considering the holistic customer experience when using the road network. Currently, each highway authority regularly focuses on their specific road network in isolation, often ignoring the interface between networks, which results in a disjointed user experience when completing road journeys.

> "
>
> It is difficult working with Highways England because they prioritise their network and dump their traffic onto local networks at short notice."
>
> **Corporate Lead, local authority**

> "
>
> Whenever there's an incident on the motorway, traffic quickly builds up in Exeter or the surrounding towns. The co-ordination of the management of that traffic is bad. It grinds everything to a hold and causes a big political flare up."
>
> **Transportation Strategy & Road Safety Manager, local authority**

LACK OF COLLABORATION WHEN MANAGING TRAFFIC AT A LOCAL LEVEL

There is a significant lack of collaboration between organisations when trying to manage traffic at a local level. Each organisation has its own policy drivers – Highways England are primarily concerned with the customer experience when on the SRN whilst local authorities will design their operational framework to meet their individual requirements which are dependent on geography (urban, rural etc), population, and policy drivers. The Network Management Duty provides a regulatory framework for collaboration but there is no standard framework nor performance indicators to assess both baseline and progress.

> "
>
> We subscribe to NILO notifications, which are useful but need to be filtered to the local region. We also used to receive good quality ANPR (Automatic Number Plate Recognition) data which was good to understand vehicle volume, but this has dataset has decreased dramatically over the years."
>
> **UTMC Manager, local authority**

> "
>
> We don't have a great enough understanding of the movement on the SRN – how many people are moving from point A to B on the road network at any time."
>
> **Corporate Lead, local authority**

NO ESTABLISHED DATA STANDARDS FOR ALL SYSTEMS

Due to the legacy systems that are still used across the industry, there are several challenges the different organisations currently experience when trying to manage traffic at a local level. Local authorities and Highways England all use different UTMC systems, which have different user interfaces and different ways of working. These different systems also comply to different versions of the Datex2 data standard, which further complicates how these legacy systems can be linked across the industry.

> "
> There have been data standard challenges linking HE and LA UTMC systems. This has resulted in UTMC suppliers starting to work with the wider industry to establish data standards."
>
> **Third Party Supplier**

> "
> Each UTMC manufacturer has a different flavour of Datex II formats. This does not cause major issues on the CTM programme; however, it complicates the linking between UTMC systems."
>
> **Third Party Supplier**

ISSUES WITH THIRD PARTIES WHEN MANAGING LOCAL TRAFFIC LEVELS

There is the added complication of working with third parties when trying to manage local traffic levels. Each of the satellite navigation companies use their own specific algorithms, taking data feeds from legacy systems, such as Elgin and NTIS. However, these third parties do not share their routing algorithms with the different local authorities and Highways England. As a result, the different satellite navigation companies can significantly hinder local efforts to manage local traffic levels, often contributing to temporary spikes in local congestion and negatively impacting the customer experience when travelling on the road network.

> "
> We regularly experience problems with sat nav companies directing customers onto one particular road within our city centre. There is another parallel road that customers could take in busy times, but all of the sat nav companies direct customers onto the same road, quickly causing severe congestion in one part of the city."
>
> **Traffic Manager, local authority**

SILOED PROCUREMENT PROCESSES

UTMC systems are currently used by the different local authorities and Highways England to manage and remotely operate existing assets (such as traffic signals and messaging signs). However, as each of these organisations have procured their UTMC systems separately, they are each in separate commercial agreements. Furthermore, these systems usually have relatively low CAPEX costs, but high ongoing OPEX costs (for regular maintenance and updates).

This causes a further pain point for local authorities as they incur significant additional costs to maintain their legacy UTMC systems when they are already operating on reduced budgets. However, if there was a joined-up procurement process in place, then it would be cheaper (and far more efficient) to procure systems for a larger number of local authorities simultaneously, whilst also making traffic management across multiple organisations much easier.

> **"**
>
> Any requirement to upgrade UTMC systems usually involves a cost. Any OPEX costs are absorbed by the local authority which is challenging when resources are already constrained."
>
> **Innovation Lead, local authority**
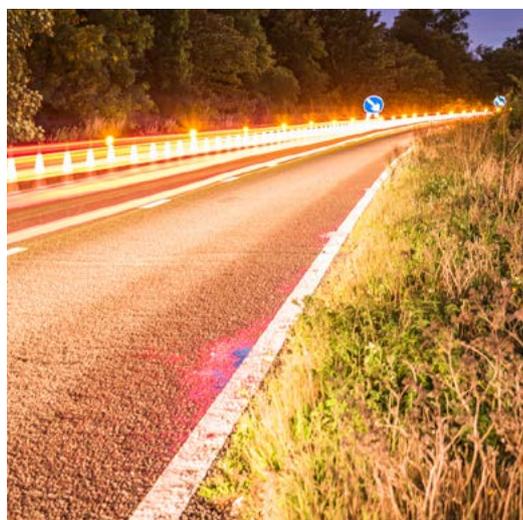
4.2 Case Study One – West Midlands Regional Transport Co-ordination Centre

The West Midlands Regional Transport Co-ordination Centre (RTCC) is a successful example of increased co-ordination between local authorities, public transport operators and road networks to manage local congestion levels. The RTCC is 'a multi-agency operation providing a unified and common view of the local transport network'[15] within the West Midlands, taking data feeds from various sources in the transport industry, including: Highways England, local authorities, Network Rail, the emergency services, and rail and bus companies. This enables the RTCC to provide support, and increase collaboration between, local authorities, emergency services and transport service providers across the region when managing local transport networks. Furthermore, it combines real-time information across multiple modes of transport into one place, providing the latest journey information for residents, businesses and visitors.

RTCC INVESTMENTS

Between September 2018 and January 2020, Transport for West Midlands (TfWM), with support from the DfT's Transforming Cities Fund[16], invested £22million to develop the RTCC capability. This investment included:

▶ Upgrading existing traffic signals and CCTV technology, connecting these assets to the RTCC

▶ Establishing the RTCC headquarters at the TfWM offices in central Birmingham (investing in the latest equipment for the RTCC)

▶ Developing technology to monitor average journey times and enable real time data alerts in response to congestion

RTCC BENEFITS

The West Midlands region has experienced multiple benefits from the development of this RTCC. These benefits include:

▶ Increased collaboration between local highway authorities to improve roads, junctions and road safety

▶ Real-time congestion and traffic management for multiple modes of transport

▶ Real-time end-to-end journey information for residents, businesses and visitors

▶ An accurate single view of works, incorporating planned works for local roads and railways

▶ Storage of all captured data to help future projects that support TfWM's goal of creating an integrated transport system

▶ Increased commercial benefits, with the car manufacture Jaguar Land Rover now using RTCC data in its CAV models

> 66
>
> [This RTCC] means more accurate travel information and better alternative options for anyone who lives, works or visits the region as well as better journey times and less time spent sat in traffic."[17]
>
> **Andy Street, Mayor of the West Midlands**

---

15 https://www.tfwm.org.uk/strategy/network-resilience/congestion-management-plan/regional-transport-coordination-centre/

16 https://www.ukauthority.com/articles/transport-for-west-midlands-opens-co-ordination-centre/

17 https://www.wmca.org.uk/news/transport-secretary-officially-opens-congestion-busting-transport-centre-for-the-west-midlands/

4.3   Deep Dive Two: Customer re-routing

Diversion routes fall into two categories: planned diversion routes and emergency diversion routes. Planned diversion routes are routes that are implemented when there are planned maintenance works on the road network; emergency diversion routes are implemented in response to unanticipated incidents on the road network.

Addressing the way that diversion routes are captured, stored, exploited and shared between organisations will play a key role in improving data collaboration. These will help the different highway authorities identify how to effectively divert traffic whilst managing network capacity and maintaining traffic flow. Furthermore, other existing initiatives, such as the A2M2 Connected Corridor[18] (which is explained later in this report), are investigating how to leverage the latest CAV technology to communicate diversion routes in-car with customers when on their journeys.

The issues highlighted below focus on the challenges that the different highway authorities experience when trying to implement diversion routes on the road network.

LACK OF COLLABORATION WHEN CLOSING ROADS

As referenced earlier in this report, the lack of collaboration between Highways England and local authorities when closing roads and re-routing customers is a significant pain point for the wider industry. Currently, the different organisations do not regularly share road closure data, with customers actively diverted via diversion routes onto local roads that are already closed due to local road works. This can have a significant negative impact on journey times for customers, whilst also significantly impacting local traffic levels and angering residents due to unanticipated increases in local traffic flow.

This lack of collaboration when customer re-routing can also have a significant impact on freight companies who often have tight delivery timescales. If haulage companies are unable to deliver their goods on time (due to unsuitable and lengthy diversions when being re-routed) this can have a significant economic impact on these companies (due to late delivery fees). This can also affect the performance of the wider UK economy as manufacturing industries do not receive their goods on time.

> ❝
>
> Local Authorities put works on diversion routes that we are not aware of. We just don't have that visibility. There is no national view of road works for all organisations and how these road works will impact traffic."
>
> **Customer Experience, Highways England**

> ❝
>
> They should take into account that they need a diversion that's OK for lorries [i.e. low bridges], but they don't always."[19]
>
> **Professional drivers, large vehicles, Bristol**

---

18   https://www.gov.uk/government/news/signs-of-the-future-new-technology-testbed-on-the-a2-and-m2-in-kent
19   Road information: the user perspective, Transport Focus, June 2019, p8

CHALLENGES WHEN ACCESSING DATA

Diversion route data for these organisations is currently stored in unstructured file formats (such as .pdf files); on local CD-ROMs; and on local hard drives. There is no central repository that contains all confirmed diversion routes at a local or national level, whilst there is also no system that currently shows all active diversion routes in place on the road network. This makes it very difficult for the different organisations to understand which diversion routes might be suitable for either planned works or when reacting to an incident on the network. This pain point is particularly important when reacting to an incident on the network where time is especially critical, such as when responding to an emergency. The different organisations need to know which diversion routes are available and which would be most suitable at any given time.

"

Highways England do publish traffic data but that it is hard to find, requiring searching and navigating to the right website, locating the right report and so on. The data is not real-time and is usually in csv format."

Traffic and Network Manager, local authority

"

Our database is lacking signage information from local authorities. It is not easy to get as there are so many local authorities and the information is scattered. We would appreciate a central repository."

Strategic Partner Development Manager, third party

DATA REFRESH RATES FOR DIVERSION ROUTES

Another significant pain point regarding customer re-routing is that most existing diversion routes were established many years ago. However, infrastructure within local regions is not static; new hospitals; new schools; and new housing developments are regularly constructed, which can result in previous diversion routes no longer being suitable. Despite this, there are no established processes in place across the different organisations to regularly monitor their existing diversion routes for continued suitability. Consequently, existing diversion route data is not refreshed to ensure these diversion routes continue to be fit for purpose.

"

There were yellow symbols on Highways England signs that no one knew what they related to, what the routes were etc. We had to ask around and senior people from Highways England had to obtain these from Kier in PDFs dated in 2008. I couldn't find this information on diversion routes anywhere online."

Traffic and Network Manager, local authority

LIMITED CONFIRMED COMMUNICATION PROCESSES ACROSS THE INDUSTRY

A key pain point regarding customer re-routing is the lack of a confirmed communication process across the industry when reacting to incidents on the road network. Often, individuals don't know who to speak to within specific organisations and do not have access to their direct contact details. Furthermore, any communication that is received is often received retrospectively, or too late for the different organisations to react.

> 66
>
> Keeping up to date with information from local authorities is very difficult. There are not many times I spoke to the same person more than once. There is no process. It is all on an ad-hoc basis."
>
> **Regional Sourcing Specialist, third-party company**

> 66
>
> Occasionally we get a call from the RCC if there has been an incident on the highway. Most of the time we don't, and we are reliant on emails and they only come through a long time after the incident has occurred. The faster we can get the information, the better. Ideally in 5 minutes, because once you reach critical levels, an email half an hour later is not going to meet that need."
>
> **Traffic Control Service and IT solutions, local authority**

COMMUNICATIONS WITH CUSTOMERS ARE OFTEN INEFFECTIVE

Lastly, when focusing on customer re-routing, existing communication methods for customers could be improved. Meanwhile, customers may not necessarily check the latest traffic information when starting their journey and so are unaware of any emergency diversion routes that have been put in place due to an incident on the network before they start their journey. Furthermore, legacy communication channels, such as messaging signs (including VMS) can also have limited effects for customers as they either ignore the messages or see them too late (once they are in traffic jams). These problems are compounded by a general lack of assets on trunk roads to communicate with customers, advising them of any diversion routes that are currently in place on either the SRN or the local road network.

> 66
>
> When we need to divert away from our network, we have asked HE to display our messages on their permanent VMS assets. However, that is not possible because of strict legislation around legends which then makes these VMS signs not useful for LAs anymore."
>
> **Traffic Control Service and IT Solutions, local authority**

> 66
>
> If the sign tells me the road's closed and Google Maps says it's not, I'm going down that road."[20]
>
> **Business driver, Bournemouth**

> 66
>
> I'll use Waze if I'm not sure of the route but if I know the roads, I won't bother obviously."[21]
>
> **Business driver, Nottingham**

....
20 Road information: the user perspective, Transport Focus, June 2019, p8
21 Ibid. p4

4.4 **Case Study Two** – A2M2 Connected Corridor

When focusing on customer re-routing, one of the key pain points that continued being expressed across the industry was the ability to effectively communicate diversion routes with road users. There were similar issues for both planned and unplanned diversion routes, with customers not regularly reading local signage advising of diversion routes or choosing to follow their satellite navigation providers (rather than the signposted diversion route).

With that in mind, we can apply lessons learned from the recent work undertaken across the sector when developing the A2M2 Connected Corridor. This is a joint project featuring the Department for Transport, Highways England, Transport for London and Kent County Council. It was also part of InterCor, an EU project testing services that work across international borders, connecting the UK to the Netherlands, France and Belgium.

This programme showcased how the different organisations can work collaboratively to standardise connected technology solutions. The in-vehicle signing use case is particularly relevant as it reduces the likelihood of drivers missing key information. This should increase the effectiveness of diversion routes when they need to be deployed on the road network, whilst also setting the foundations for communicating with third parties (such as satellite navigation companies) as they also look to communicate any route updates with their customers.

> **"**
>
> Connecting vehicles to each other and the road around can improve journeys, make them safer and give drivers reliable, real-time personalised information; it could also help us manage traffic and respond to incidents."
>
> **Head of Intelligent Transport Systems Group, Highways England**
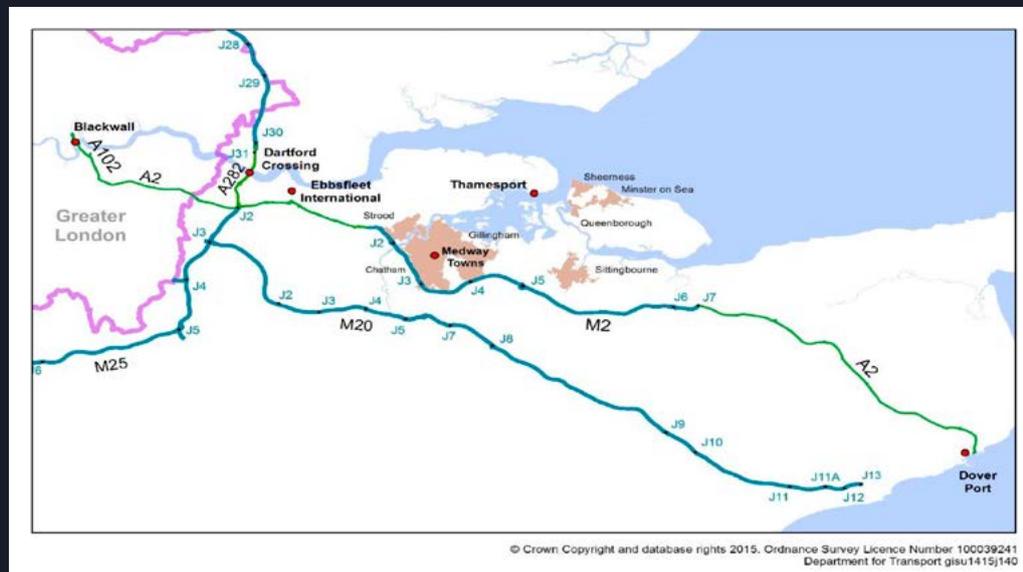
The UK Corridor – A2/M2 Connected Vehicle Corridor, Department for Transport, September 2015

5. STAKE-HOLDER MATURITY MODEL

When designing our stakeholder maturity model, we investigated a range of effective reference points to measure collaborative relationships. The approach that we chose to leverage was the 'Taskforce on TM2.0 as a Trusted Network'[22] which was developed by Ertico to enable effective vehicle interaction with traffic management services.

Although the Ertico model aimed to 'define the role of trust in collaboration'[23], we have refined this approach to focus on improving data sharing and collaboration between the different highway authorities (therefore increasing the fluidity of data). The TM2.0 model identified that there are three different levels of behaviour that organisations can demonstrate when implementing optimal traffic management services. These behaviours are summarised below:

Level 1 behaviour:
Stakeholders exchange traffic management information to improve the mutual understanding of the status of the road network; however, this does not lead to operations from a common viewpoint or co-ordinated activation of traffic measures.

Level 2 behaviour:
Stakeholders exchange traffic management information and this is brought together in a joint framework to provide a common operational view of the road network. Stakeholders also activate traffic measures from the information shared in this joint framework.

Level 3 behaviour:
Stakeholders co-ordinate and activate services based on a joint approach in traffic management and start from a common viewpoint on the status of the road network. Collaboration on a strategic level is required for this approach, with extensive understanding and agreement on what stakeholders will do with the information that is shared.

22 http://tm20.org/wp-content/uploads/sites/8/2019/08/TM2.0-TF-Trusted-network-Final-report.pdf
23 Ibid. p2

From the pain points captured during our discovery (which are reflected earlier in this report), we consider that our stakeholders are currently exhibiting the level 1 behaviours summarised above. Collaboration within the sector is currently limited to the different organisations sharing data. However, as reflected in the earlier pain points, this data is not shared effectively and there is co-ordinated view of traffic operations between highway authorities.

HIGHWAYS ENGLAND AND LOCAL AUTHORITIES MATURITY MODEL

It is clear from our stakeholder engagement that the current working practises between the different organisations are not good enough. They are not delivering effective traffic management services for road users or building trust between organisations. Therefore, creating an environment for better services between the different highway authorities should be a top priority. There needs to be a fundamental change in the way that the different highway authorities operate to provide better experiences for customers, but also to support other initiatives and ensure that highway authorities can prepare for the Future of Mobility.

To identify an approach that would deliver fundamental change, we undertook a continuous and iterative process of comparing the proposed recommendations with the different stakeholder pain points. This enabled us to create a bespoke maturity model that could track the progress in building collaboration and data sharing processes between the different organisations, whilst also delivering effective change for the traffic management sector.

Stakeholder Maturity Model
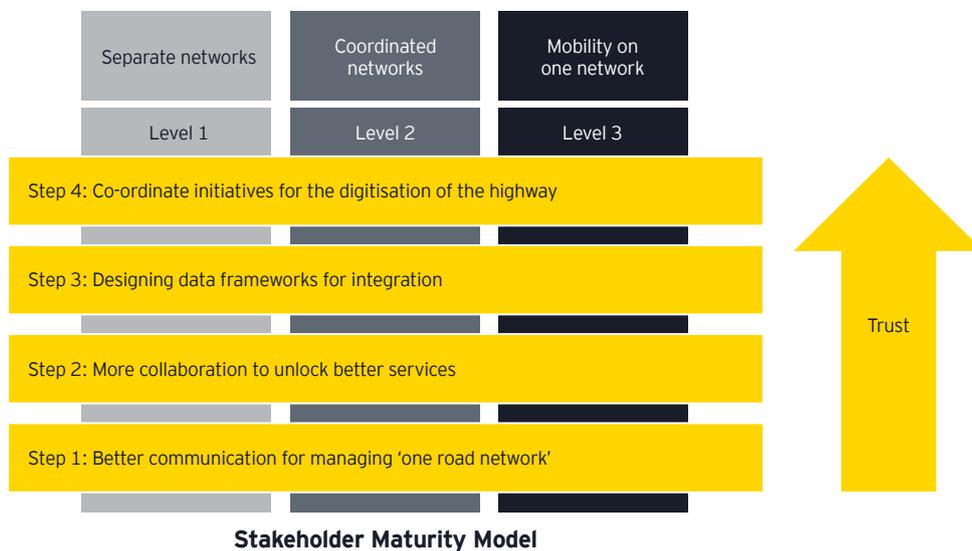
As can be seen in our stakeholder maturity model above, there are several steps that the different highway authorities will need to navigate when building new processes between organisations and delivering lasting change. These steps are summarised below:

Step 1	Step 2	Step 3	Step 4
Improve communication processes and channels as the highway authorities work together to manage one seamless road network for their customers.	Drive more collaboration between the different organisations as this will help unlock better traffic management services for road users.	Design comprehensive data frameworks as these will support the integration of existing systems and enable more effective data sharing across the industry.	Co-ordinate future initiatives between organisations for the digitisation of the highway (although this can only be achieved once there is increased trust between the different organisations).

The different steps in the above stakeholder maturity model help shape the recommendations that are specified within this report.

6. RECOMMEN-DATIONS

Implementing the recommendations within this report will not only address the articulated pain points but will also build trust between the different highway authorities, other stakeholders and customers.

6.1. Better communication for managing 'one road network'

This set of recommendations addresses both the ongoing communication issues between the different highway authorities and the challenges when communicating with customers on the road network.

6.1.1. Establish communication layers for different services

Consider establishing the appropriate communication layers across the different highway authorities to support ongoing traffic management services. Currently, there is limited activation of co-ordinated traffic measures across the industry due to a lack of confirmed communication layers. Establishing these specific layers of communication for the different services would help the different authorities to work collaboratively when implementing traffic management services. Whilst establishing these layers of communication, it is also recommended that the different authorities work collaboratively to consider how to utilise different technological solutions that could support the ongoing management of these communication layers once they have been established.

6.1.2. Strengthen operational communication channels to support traffic management

Investigate how to strengthen operational communication channels between the different authorities when implementing specific traffic management activities. There are currently no confirmed operational communication channels that are used across the industry in response to specific traffic management scenarios – such as responding to incidents or confirming planned road closures – with any communications between these organisations being ad-hoc, limited, or non-existent. From the stakeholder pain points, further consideration should also be given to the mechanism to implement a two-way information-flow between Highways England and local authorities, so that the different organisations receive information from each other, implement an appropriate strategy and then clearly communicate the action taken. Also consider designing alerts that can be published between highway authorities regarding changes in network operating conditions. This would enable adjacent network operators to focus on the specific change and implement traffic control strategies on their networks.

6.1.3. Review customer communication channels and remove existing silos

Review the mechanisms for communicating with customers when implementing traffic management services. These communication challenges are compounded by the different authorities continuing to work in silos, with no common viewpoint and no common understanding of the wider infrastructure status. As part of this review of customer communication channels, it is recommended that the different authorities work in collaboration to investigate how to leverage the latest technological trends to optimise customer communication and share effective information for co-ordinated traffic management.

6.2. More collaboration to unlock better services

These recommendations address the ongoing challenges that are experienced by the different highway authorities as they try to work collaboratively to deliver better traffic management services for their customers on the road network.

6.2.1. Establish appropriate governance between HE, DfT and LAs to increase collaboration

Review the project governance that has been established during this discovery phase and consider establishing ongoing mechanisms to continue this dialogue between organisations. As part of this review, confirm the leadership accountabilities and responsibilities between authorities (integrating and completing co-ordinated activities together) whilst also identifying how to secure government investment and support to drive this initiative forward. It is also recommended to consider how to evolve existing forums (such as the Transport Technology Forum and the National Traffic Managers Forum), refining and realigning their focus to drive adoption of the digital agenda for the wider industry.

6.2.2. Make better use of existing legislative framework to foster better collaboration

The Network Management Duty (NMD) and the role of the Traffic Manager are well defined. Consideration should be given to a review of these functions in relation to better collaboration as described in this report, and consider whether the accompanying statutory guidance is suitable, or whether it needs to be strengthened to support better integration between Highways England and neighbouring highway authorities. During this review, consideration should also be given to the future trends for the sector and whether any relevant performance targets will be specified in RIS2 that may impact the NMD and the accompanying statutory guidance.

6.2.3. Review and scale existing programmes to improve collaboration and services

Investigate how to raise awareness across the sector of existing programmes that are currently being delivered to improve collaboration and co-ordination between authorities when delivering services (such as traffic management; customer re-routing; co-ordination of works; and providing information to customers). Examples of existing programmes that will improve collaboration and services between highway authorities are summarised overleaf:

STREET MANAGER

Street Manager is a new digital service that will transform the planning, management and communication of street and road works. Developed by the DfT, and due to be released shortly, Street Manager will enable a single source of accurate, up to date and open data on road and street works. This will enable improved collaboration between highway authorities, utility companies and their contractors, transforming the planning, management and communication of street and road works.

THE CTM PROGRAMME

The Collaborative Traffic Management (CTM) Programme is key to the discovery – it provides a foundation for developing solutions at the interfaces between the two networks; serves as a framework for wider collaboration and strengthens the business case for integrating the networks. Whilst the focus is on integration of systems (such as UTMC systems), there is a formalised process based on agreement and co-operation. These agreements enable operators from Highways England and local authorities to manage different traffic management assets (such as traffic signals and VMS signs) at a local and national level. Such a capability will help provide a common viewpoint on the infrastructure status across the road network, whilst also supporting a joint approach in traffic management.

The benefits of CTM are proven. There are significant proposals to extend the co-operation between the interfaces to integrating with major trip generators (such as shopping centres, etc) and other transport terminals and ports. These developments will embed the co-operation at system and policy level.

The CTM programme is, for the most part, dependent upon system integration. Further consideration could be given to extending the principle to enable integration where UTMC compatibility/availability is not possible.

THE CHARM PROGRAMME

The Common Highways Agency Rijkswaterstaat Model (CHARM) Programme is an ongoing technology and transformation programme that has the capability to significantly improve collaboration between the networks. One of CHARM's primary outputs will be a common user interface for different traffic operators who currently use different UTMC systems when controlling assets to manage local traffic levels. These UTMC systems have different user interfaces with different functionality. As CHARM is delivering a common user interface for all UTMC systems, it will improve collaboration across the industry standardising working practises and system terminology for different highway authorities.

Along with these three programmes, there are two other initiatives that will support increased collaboration between highway authorities:

DECARBONISATION AND AIR QUALITY PROGRAMMES

To improve air quality, some local authorities are introducing clean air zones[24] (CAZ). There is a clear and demonstrable need for further investigation as to how a 'one network road management approach' could lead to integrated traffic management measures and systems that design better air quality solutions.

SUB-NATIONAL TRANSPORT BODIES

The establishment of the sub-national transport bodies (SNTBs) has brought significant change to the way local authorities deliver national infrastructure programmes, focusing on local and regional integration. The SNTB's have recognised the importance of data and have invested effort in understanding, collecting and harnessing cross-boundary data and the need to work with their local authorities' partners to maximise synergies for data.

Section 4.2 demonstrated the exemplar scheme provided by West Midlands Regional Traffic Control Centre and we are aware of the work being undertaken by England's Economic Heartland. Further work should be undertaken to map and review cross-boundary working and to capture good practice from the SNTBs in developing joint procurement and data sharing platforms which could support improved collaboration between Highways England and local authorities.

6.2.4. Define joint outcomes and prioritise initiatives and investments

Investigate rationalising future traffic system and data initiatives and investments from the different highway authorities, defining joint outcomes between organisations and identifying any opportunities for collaboration and co-ordination. This would help streamline investment on the right initiatives and maximise return on financial investments for the whole of the road network.

....
24 https://www.gov.uk/government/publications/air-quality-clean-air-zone-framework-for-england

As part of this investigation, also determine whether any existing procurement processes for traffic systems and data can be aligned or whether new procurement processes could be implemented. This could enable a range of suppliers to achieve united outcomes for the broader traffic management industry, whilst also generating maximum value for the different highway authorities. Investment may be required across network boundaries to enable a seamless real-time picture to be captured. Equipment may well be required to be situated and maintained on one network to provide information to the operator of an adjacent network. This may shake up individual business case decisions on investment, which are currently typically silo-based.

6.3. Designing data frameworks for integration

These recommendations address the ongoing challenges regarding data management and data sharing between the different highway authorities.

6.3.1. Conduct a data health check

Expand on the initial assessments undertaken during this discovery phase and complete a more detailed analysis of the capability of highway authorities to develop new data management processes. This comprehensive analysis of current processes would lead to an in-depth understanding of current local authority capability to implement new data management procedures. This will also help identify the investment required for the different organisations to prepare for new technologies or develop common standards across the sector.

6.3.2. Establish one data management framework that outlines common principles, policies and standards for data exchange

The pain points have established that a lack of common data standards represents a critical pain point. 'One road network' requires data to support interoperability between current and future assets and systems, whilst facilitating open data exchange, integration of services and stricter data governance processes. Although the development of a data management framework is an essential requirement, it is also a significant challenge. Highways England is developing a single information management system, which will establish requirements, specifications and processes that could enable improved data sharing between organisations for effective traffic management.

Within the information management system, they are defining an ontology including appropriate terms, codes and data structures to facilitate data exchange. This will improve data consistency and collaboration across the authorities, save costs in the long term, whilst also encouraging and enabling the re-use of data. There are several separate steps that should be undertaken when establishing this robust data management framework across all highway authorities. These steps are illustrated in the below graphic and then described in more detail in the report.

6.3.2.4 — Establish a data management framework for highway authorities

6.3.2.3 — Specify data interoperability to enable greater data exchange

6.3.2.2 — Establish data policies to strengthen data governance

6.3.2.1 — Confirm data principles for improving data sharing

Data Management Framework methodology
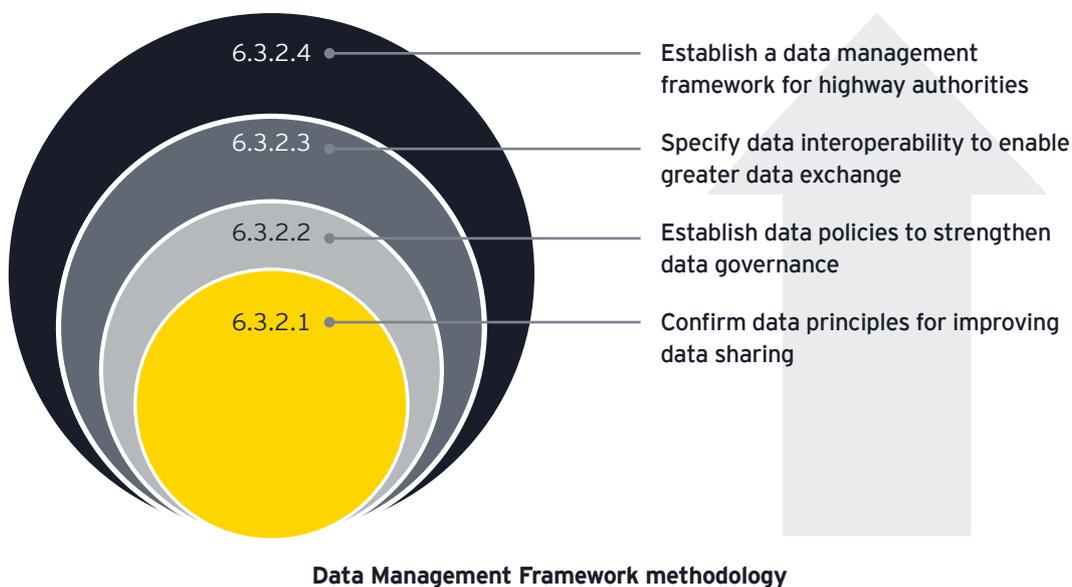
6.3.2.1. Confirm data principles for improving data sharing

Establish a set of consistent data principles for all highway authorities, identifying the key data priorities to improve collaboration and co-ordination between organisations. Investigate leveraging Highways England's ten principles from their Information Vision and Strategy framework as a starting point when establishing these data principles. Also consider how to work with the different highway authorities so that they subscribe to these data principles, supporting both consistent data management and data exchange.

6.3.2.2. Establish data policies to strengthen data governance

Consider designing and implementing robust data policies that support current ways of working and strengthen data governance for operational processes. When strengthening data governance – for example, establishing effective data policies, data owners and data stewards across the industry – understand how this will operate within the existing policy framework (such as the NMD) and how it will be maintained across the industry. As part of this recommendation, it is recognised that any data policies developed for system-to-system interfacing should be supplier-agnostic as there are a range of systems in use across the country.

6.3.2.3. Specify data interoperability to enable greater data exchange

Consider implementing open data formats for all highway authorities, whilst also investigating the establishment of consistent data standards across the industry. Consider working with stakeholders from different highway authorities and the British Standards Institute (BSI) to develop data standards that enable more effective data exchange and data exploitation across the sector.

6.3.2.4. Establish a data management framework for highway authorities

Consider sharing with local authorities the work currently being undertaken by Highways England to serve as a common data management framework and ontology that can be adopted by all.

6.3.3. Design interoperable data services

Design interoperable data services or data management strategies that are suitable for improving collaboration and traffic management services between local highway authorities and Highways England. These data services should be designed holistically, confirming that these are a suitable option for data integration, storage, management and analytics across the industry. When designing these interoperable data services, also consider any financial investment required for highway authorities to upskill existing staff with data management capabilities and investigate the financial impact and potential benefits of developing these services with local authorities (the majority of whom are already experiencing financial constraints).

> **"**
>
> By 2022, no less than 54% of all employees will require significant re- and upskilling. Among the range of established roles that are set to experience increasing demand in the period up to 2022 are Data Analysts and Scientists, Software and Applications Developers."[25]
>
> **World Economic Forum**

....
25 The Future of Jobs Report 2018, World Economic Forum, p9

6.4. Co-ordinate initiatives for the digitisation of the highway

These last set of recommendations address the existing challenges when trying to improve co-ordination between the different highway authorities. Some of these recommendations are geared towards a future vision of one seamless road network which can leverage the latest technologies within the sector.

6.4.1. Identify the delivery model to deliver digital initiatives in a co-ordinated way

Investigate suitable delivery models to develop digital initiatives designed to improve collaboration across the industry in a co-ordinated manner. During this investigation, identify any required business change activities to develop one united strategy and one co-ordinated roadmap for highway authorities with direct interfaces with Highways England, setting the foundations for the digitisation of the highway.

6.4.2. Work with third parties (such as technology and satellite navigation companies) to take advantage of technological enhancements and investment opportunities

Identify ways to build closer commercial and working relationships with third parties, using these relationships as an opportunity to continuously scan the horizon for new technological capabilities. These closer relationships will provide the opportunity to leverage the latest technological advancements and investment opportunities to support a high level of service provision for customers (for example, developing artificial intelligence and predictive traffic management capabilities across one road network). It is also recommended to use these closer relationships to identify how to address existing commercial contracts between authorities, especially as these contracts may prohibit closer collaboration across the industry in some instances.

77%

of survey respondents said that third parties access their data.

"

We know that data is collected by up to 220 third parties, but we do not know what they do with it or whether they pass this on to other parties."

Highways England stakeholder

6.4.2.1. Consider socially acceptable routes when working with satellite navigation companies

Consider the feasibility, and establish a potential pilot, for working with satellite navigation companies to develop and embed socially acceptable customer routes within their navigation algorithms (identifying if this work can be aligned with their existing research and development initiatives). During this investigation, identify which existing services could be improved and any opportunities for increased collaboration, co-ordination, data sharing and trust between highway authorities and third-party companies.

6.4.2.2. Review and digitise existing traffic management plans

Establish an effective mechanism for highway authorities to conduct detailed reviews of their local traffic management plans designed for incident management on collaborating networks. As part of this mechanism, confirm whether these organisations will need to implement any additional process changes (such as regular plan reviews) to ensure the continued accuracy of this information. During this process, also consider the most effective way for highway authorities to digitise and store their traffic management plans, both for regular updates and for wider sharing between organisations.

6.4.3. Identify opportunities to leverage data for better network management

Investigate other opportunities to leverage digitised information to support improved traffic management services designed for better collaboration. Highways England have digitised existing route cards for their diversion routes using WordCAD (with GIS versions available online). Further research should consider how to use this data to leverage capabilities such as predictive and iterative modelling – and machine learning – to identify the best diversion routes (which can then be communicated to road users). Further analysis should identify how to use these capabilities to understand fluctuations in network performance (for example, considering available network capacity before, during and after a peak period of traffic flow).

7.
APPENDICES

7.1   Appendix One: summary of stakeholders engaged

LOCAL AUTHORITIES

During the scoping phase of the project, we considered the diversity of many local authorities and the existing differences in data management and data maturity between certain organisations (with some further in their data journey than others). With the guidance of our DfT and Highways England sponsors, we selected 12 local authorities to interview to ensure a broad cross-section of responses, reducing bias across the report.

Other than existing levels of data management and data maturity, the following criteria were also used when selecting which local authorities to engage with:

▶ Exposure to the SRN

▶ Involvement in other data-related initiatives

▶ Population density

▶ Rural or urban locations

▶ Geographic locations

HIGHWAYS ENGLAND

We also engaged with members from Highways England who focus on data initiatives, related system architecture and roles which impact the customer journeys on the SRN. This helped ensure that the relevant technical and contextual questions could be answered by stakeholders. As we have also worked with Highways England to help develop their 'Information Vision and Strategy' for RIS2 and beyond, we were able to leverage additional knowledge and insights from this work.

THIRD PARTY COMPANIES

The primary focus during this discovery phase was the relationship between Highways England and local authorities. Relationships with third party companies haven't driven this discovery as they are secondary beneficiaries from improved operations and ways of working between the different highway authorities. However, we did engage several third-party companies, as they often affect the customer's experience when completing their journeys, particularly when directing road users on their journeys via satellite navigation technology. Therefore, a range of satellite navigation providers, data processing and standards organisations and other organisations were also targeted during this engagement to understand their experiences when working with Highways England and local authorities.

Over the course of this engagement, we engaged with a total of

95

stakeholders across

41

organisations to understand their pain points.

7.2 Appendix Two: Summary of engagement and engagement methodology

STAKEHOLDER ENGAGEMENT

21
▸ Total number of local authorities engaged

31
▸ Total number of local authority stakeholders engaged

10
▸ Total number of Highways England stakeholders engaged

5
▸ Total number of DfT stakeholders engaged

6
▸ Total number of Sub-National Transport Body stakeholders engaged

12
▸ Total number of third-party companies engaged

18
▸ Total number of third-party stakeholders engaged

We also presented at additional forums, such as the National Traffic Management Forum and an A2/M2 Connected Corridor workshop. Both forums helped support local findings and also provided us with additional exposure to organisations and programmes that supported our research.

10
▸ A2 M2 Workshop Participants

15
▸ National Traffic Management Forum Participants

DEEP DIVE WORKSHOPS

34
▸ Total deep dive stakeholder participants

Once we had completed our stakeholder engagement sprints and processed the captured information, we hosted digital deep dive workshops re-engaging key stakeholders to discuss integrated Traffic Management between the networks and Customer Re-Routing in further detail. Importantly, we interviewed stakeholders that associated a high quantity of pain points regarding these themes, enabling us to explore these further, understand the underlying complications, as well as conduct deep dive workshops with the different organisations.

These virtual workshops enabled us to accommodate stakeholders representing both different local authorities and varying relationships with Highways England. The success was reflected in a successful turnout across the industry with a variety of SMEs from Highways England, local authorities and third-party companies attending these sessions. These workshops provided valuable insights into the technological and industry limitations with current solutions, whilst also identifying how to address these existing barriers.

DATA MATURITY ASSESSMENT

14

▶ Number of Local Authority stakeholders who participated

7

▶ Number of Highways England stakeholders who participated

1

▶ Number of Department for Transport stakeholders who participated

Developed using the DMBOK II framework, the data maturity assessment covered questions to create a high-level understanding of the following data elements:

Data Management	Data Dictionaries	Data Ownership	Data Security	Data Storage

Each organisation's existing data scored appropriately given their responses, where the results were either low, moderate or high maturity.

PAIN POINT SURVEY

19

▶ Total Respondents

To create a wider understanding of the issues surrounding information sharing in the transport industry, our pain point survey was published on the Technology Transport Forum and the Transport Data Initiative. This survey complemented our stakeholder interviews and captured additional pain points from local authorities, Highways England, and third parties. Select statistics from this survey are included throughout this report.

7.3   Appendix Three: List of stakeholders engaged

A detailed aggregation of the organisations engaged during this data discovery project has been illustrated below:

DEPARTMENT FOR TRANSPORT

1. Head of Traffic and Technology
2. Deputy Director of Analytics and Data Division
3. Head of Data Policy, Analytics and Data Division, Department for Transport
4. Head of Street Works Policy
5. Product Manager: Street Manager

HIGHWAYS ENGLAND

1. Chief Data Officer
2. Head of Data Architecture & Engineering
3. Operational Capability Project Sponsor
4. Network Manager – South East
5. Customer Development Manager
6. Principle Enterprise Architect
7. Head of Customer Experience
8. Operations & Performance Team Leader
9. Head of National Traffic Operations
10. Senior Economic Development Manager

LOCAL AUTHORITIES

1. Bath & North East Somerset Council
2. Birmingham City Council
3. Bristol City Council
4. Calderdale Council
5. Cambridgeshire County Council
6. Devon County Council
7. Dorset Council
8. East Sussex County Council
9. Essex County Council
10. Hull City Council
11. Kent County Council
12. London Borough of Hackney
13. Newcastle City Council
14. Norfolk County Council
15. Oldham Council
16. Oxfordshire County council
17. Portsmouth City Council
18. Southend on Sea Borough Council
19. St Helens Council
20. Suffolk County Council
21. York City Council

SUB-NATIONAL TRANSPORT BODIES

1. Transport for Greater Manchester
2. Transport for London
3. Transport for North
4. Transport for South East
5. Transport for West Midlands
6. England's Economic Heartland

THIRD PARTY ORGANISATIONS

1. Atkins
2. BSI
3. BSJJ
4. Chordant Europe
5. Elgin
6. External Consultant
7. Here
8. INRIX
9. Stagecoach
10. TomTom
11. Transport Focus
12. WSP

7.4 Recommendation Mapping Table

When considering the recommendations in this report, it is important to acknowledge which of the original pain points each of these recommendations will address.

With that in mind, the below table maps each of the recommendations against their applicable pain points.

Pain Point	Recommendation												
	6.1.1	6.1.2	6.1.3	6.2.1	6.2.2	6.2.3	6.2.4	6.3.1	6.3.2	6.3.3	6.4.1	6.4.2	6.4.3
1. Communication													
1.1. Operators don't know who to communicate with between the road networks	■												
1.2. There are limited established communication channels		■											
1.3. There are no standard communication processes across the industry	■	■											
1.4. Communications between the road networks are often reactive	■	■											
1.5. "One road network" communications with customers are not coherent			■										
2. Collaboration													
2.1. Conflicting policy drivers for both road networks				■		■							■
2.2. There is a lack of collaboration between the respective organisations when managing diversions and closures					■	■							
2.3. With exceptions, issues for managing traffic at the interface between the networks					■	■	■						
2.4. Current forums to encourage collaboration need to be strengthened				■									
2.5. Collaboration is affected by different working practises						■	■						
2.6. Limited collaboration between the different organisations when sharing TRO data						■						■	
3. Data and Systems													
3.1. Lack of consistent data management frameworks								■	■				
3.2. Different levels of data maturity between organisations								■	■				
3.3. Data is refreshed at different rates by different organisations									■				
3.4. Lack of real-time data for traffic management									■	■			
3.5. Data is not shared effectively between Highways England and local authorities								■	■	■			
3.6. Data that is shared needs to be effective									■				
3.7. Wide range of systems used across the industry which are not interoperable								■	■				
4. Co-ordination													
4.1. Siloed working between organisations						■	■				■	■	■
4.2. Siloed procurement processes across the sector						■	■				■		■
4.3. Contractual obligations to different third parties						■	■					■	■

EY | Assurance | Tax | Transactions | Advisory

About EY

EY is a global leader in assurance, tax, transaction and advisory services. The insights and quality services we deliver help build trust and confidence in the capital markets and in economies the world over. We develop outstanding leaders who team to deliver on our promises to all of our stakeholders. In so doing, we play a critical role in building a better working world for our people, for our clients and for our communities.

EY refers to the global organization, and may refer to one or more, of the member firms of Ernst & Young Global Limited, each of which is a separate legal entity. Ernst & Young Global Limited, a UK company limited by guarantee, does not provide services to clients. For more information about our organization, please visit ey.com.

Ernst & Young LLP

The UK firm Ernst & Young LLP is a limited liability partnership registered in England and Wales with registered number OC300001 and is a member firm of Ernst & Young Global Limited.

Ernst & Young LLP, 1 More London Place, London, SE1 2AF.

ED None

EY-000116881 (UK) 03/20. Artwork by Creative Services Group London.

ey.com/uk