ADEPT Live Labs Thematic Ex-Post Business Case

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Live Lab Name	**TfWM Network Resilience Live Lab**
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Theme (e.g. sensors, energy etc.) Column B of spreadsheet	**Data and AI; Research; Sensors**
Intervention	• Deployment of Static Automated Traffic Counters (SATCs) • Processing and visualisation of SATC data • Predictive analytics based on the SATC data • Development of traveller personas based on the All Traveller Segmentation • Tailoring campaigns to the customer • Demand management

All quoted descriptions are taken from 'GUIDE TO DEVELOPING THE PROJECT BUSINESS CASE, BETTER BUSINESS CASES: for better outcomes' documentation guide to the five-case model available at Guide to developing the Project Business Case (publishing.service.gov.uk).

Strategic Case

The purpose of the strategic dimension of the business case is to make the case for change and to demonstrate how it provides strategic fit. Demonstrating that the scheme provides synergy and holistic fit with other projects and programmes within the strategic portfolio requires an up-to-date organisational business strategy that references all relevant local, regional and national policies and targets.

Case	**Live Labs considerations**	**First pass bulleted responses (to be completed by Live Labs)**
National, regional and local policy fit	What are the policies that this intervention addresses (key sources – DfT policies, local transport plan, economic plans etc.)?	The Network Resilience Live Lab supports DfT policies including: • boosting economic growth and opportunity • improving journeys • safe, secure and sustainable transport. The West Midlands Combined Authority (WMCA) is unlocking the potential of the West Midlands. The Network Resilience Live Lab project delivers WMCA aims and objectives. In connecting our communities by delivering transport, it delivers the objective: *We will pioneer and embed transport innovations and drive behaviour change to reduce emissions, improve air quality, and enable the creation of green jobs.* A new local transport plan is currently in development. Reimagining transport in the West Midlands – WMLTP5 Green Paper contains a key theme to 'Make Behaviour Change Easy', which this project delivers.

Case	Live Labs considerations	First pass bulleted responses (to be completed by Live Labs)
The case for the intervention that meets those policy needs and priorities	How did the intervention address the policies identified?	• implementing DfT policy on running and maintaining the West Midlands Key Route Network, improve passenger and freight travel, and develop new major transport schemes • working to make our roads less congested and polluted by promoting lower carbon transport, including cycling and walking • encouraging the use of new technology such as smart ticketing and low carbon vehicles • maintaining high standards of safety and security in transport • improving our understanding of network performance and management of congestion.
The national, regional and local set of background needs and challenges	What were the background challenges that led to the intervention, linking back to the original pitch?	• The current methods ○ Did not give as complete coverage of the region ○ Were done infrequently ○ Are more expensive in the long run ○ Are usually provided in silos – internally in modal teams and externally within a range of organisations that enable people's journeys on the network.

Case	Live Labs considerations	First pass bulleted responses (to be completed by Live Labs)
The wider case for the intervention in meeting specific local needs and challenges	How did the intervention address those local needs and challenges, what have the successes been in doing so, what have been the failures?	• Related to the WMCA aims objectives, tools developed in the project helped us to reduce carbon emissions – especially from idling caused by congestion; and made it easier for people to re-mode to public transport and take up active travel. Our collaboration with Birmingham City Council and Solihull Metropolitan Borough Council and others has helped us to be a better regional partner. • Success includes a reduction in operating costs. • Success includes holistic and continuous monitoring of the region's road network. • Failure to monitor individual journeys as per the mobilisation plan. Given the number of data points being transmitted and the ethical issues, this would not have been practical or desirable.

Economic Case

The purpose of the economic dimension of the business case is to identify the proposal that delivers best public value to society, including wider social and environmental effects. Demonstrating public value requires a wide range of realistic options to be appraised (the long-list), in terms of how well they meet the spending objectives and critical success factors for the scheme; and then a reduced number of possible options (the short-list) to be examined in further detail.

Case	**Live Labs considerations**	**First pass bulleted responses (to be completed by Live Labs)**
The public value of the benefit of the intervention and associated investment	What are the wider benefits realised from the intervention? These can be tangible benefits (such as availability of an asset) or intangible (public confidence)	• A range of business changes were achieved: ○ Improve the operational capability of the Regional Transport Coordination Centre (RTCC) through innovation ○ Faster incident and accident management to keep people moving, safely ○ Reduced costs to public purse e.g. eliminating duplication of sensors, manual traffic counts ○ Work faster towards 'one camera estate ○ Improved the technology use case for West Midlands' and other partners. • Tangible benefits: ○ Reduced traffic build-up leading to quicker, less stressful movement between origin and destination. ○ Advanced, accurate warning of planned and unplanned disruption events. • Intangible ○ Reduced street furniture making the built environment more pleasant while also delivering the other benefits.

Case	Live Labs considerations	First pass bulleted responses (to be completed by Live Labs)
Public costs and benefits analysis	What were the broad costs of the intervention (this does not need to break any commercial confidences and can be broad brush) and what direct benefits did they bring?	• Approximate costs are: ○ SATC deployment - £900,000 ○ Data Analytics - £800,000 ○ Personas Development - £300,000 ○ Knowledge Dissemination - £250,000 ○ General Project - £400,000 • These were one-off investments to establish the operational processes. • The direct benefit was to improve the operational capability of the RTCC through innovation. Infinite applications may be generated from the menu of operational tools although some initial added value is being achieved through: ○ Using SATC to understand impact of the Clean Air Zone outside Birmingham city centre. ○ A trial decarbonisation campaign in Solihull. ○ Using segmentation and personas to inform Mobility as a Service (MaaS) product development. ○ Working with bus operators and TfWM operations to apply segmentation and personas to develop targeted demand responsive transport services.

Case	Live Labs considerations	First pass bulleted responses (to be completed by Live Labs)
Demonstration of benefits through qualitative and quantitative analysis	What are the measurable benefits associated with the intervention that you have observed and measured – this can be qualitative (perceptions, views etc.) and / or quantitative (cost savings, time savings etc.)	• Quantitative ○ Volume and classification of vehicle numbers on the road network. ○ Average route speed close to the speed limit of that route. ○ Better understanding of the number of unplanned disruptions. • Qualitative ○ Reducing the level of impact from planned and unplanned disruptions through improved communications and direct messaging to road users.
Key metrics	What are the wider key metrics – jobs created, people upskilled etc. and any multiplier effects – efficiency savings, scaling savings etc.	• Journey times. • Number of unplanned disruptions. • Network utilisation.

Case	Live Labs considerations	First pass bulleted responses (to be completed by Live Labs)
Indirect and induced impacts	What have the indirect impacts been of the intervention – unexpected consequences, knock on effects etc.	• Applying the menu of tools in the Covid-19 pandemic successfully, to help the region's essential workers access their sites, safely including local hospitals and the Project Nightingale Hospital. • Learnt ourselves how sensors can be deployed most cost effectively and how to utilise multiple data streams (SATC, Inrix etc) in an agile way. This helps us to be a better client for data and develop products and services of our own. • Deepened collaboration on data with our regional police force, which other local authorities have found difficult to do. • Broadened horizontal working on demand management to bring benefits for the customer. • Delivered communications campaigns differently.

The benefits of the interventions for the public are generally based on the application of the data and information generated by the interventions. Additionally, these benefits are not directly financial based, but are more focused on quality of life such as making journey easier, less time consuming and less stressful.

Tangible Benefits

- Reduced traffic build-up leading to better informed journeys / movements between origin and destination.
- Advanced, accurate warning of planned and unplanned disruption events.

With the data collected via the SATC's and machine learning being applied to that data, TfWM will be able to better predict and organise counter measures to both planned and unplanned disruptions. This will result in making travelling across the West Midlands as easy as possible, reducing the stress that road customers experience and reducing the travel time required. In an ideal case the messaging for customers would be sent out as early as possible and give alternatives modes, timings or routing for the customer to travel and this would reduce the build-up of traffic around the disruption.

Intangible benefits

- Reduced street furniture making the built environment more pleasant while also delivering the other benefits.

Due to the relatively unique way TfWM has partnered with West Midlands Police (WMP), the number of SATC's is reduced when compared to the potential alternative. The agreement allows for the SATC's to be used by TfWM to monitor traffic flow while also allowing WMP to support the region by having a view of the Key Route Network (KRN). A key issue in modern road design is the proliferation of street furniture and signage, cluttering the roads and making the task of driving more difficult due to roadside clutter, this reuse of existing hardware ensures the cluttered view is kept to a minimum. There are many other long-term benefits that have potential to be realised such as reduced stress from driving, which in turn can result in improved quality of life and reduced burden on the NHS. However, these benefits are difficult to predict as many other factors can come in to play and counter act the benefits provided by the Live Lab.

Approximate Costs

Title	Approx. Cost	Approx. Ongoing Cost	Description
SATC Deployment & Maintenance	£900,000	£350 per camera per year	The bulk if the SATC deployment in linked to the installation of the hardware and linking to the analytics system. The maintenance the SATC's is relatively low, although this does exclude some maintenance issues, such as damage from weather. This maintenance cost can be built into the initial installation price along with the data provision and cover an agreed number of years, in this case 4 years.
Data Analytics	£800,000	£6,000 per month for 4.5 million data points per day	The bulk of the cost is linked to the initial setup of the systems such as specialist support when developing for a cloud solution. The ongoing cost is billed as a monthly charge for access to the cloud solution and will scale with the amount of data to be processed and with any storage requirements for historical data analysis.
Personas Development	£250,000	£250,000 per biannual refresh	The persona development should be approximately the same each time it is refreshed to take account of shifting demographics of the region. However, this cost is supplier specific and depends of the size of the region and any supporting information available. It is feasible that TfWM could undertake the exercise itself at a cheaper price.

Qualitative & Quantitative Analysis

The items below are metrics that will be measured to inform the effectiveness of the intervention and messaging to customers.

- Quantitative
  - Reduced vehicle numbers on the road network. – When the system is fully operational, the expectation is to give customers the best option to allow them to complete their journey and should result in less unnecessary car journeys
  - Average route speed close to the speed limit of that route. – When the system is fully operational, the reduction in traffic and the routing for the most efficient route, the expectation is the average vehicle speed on any given route be closer to the posted speed limits while not exceeding them.
  - Reduction of unplanned disruptions. – As there are fewer vehicles on the road at any given time, the potential for traffic accidents and breakdown is reduced, reducing the overall number of unplanned disruptions.
- Qualitative
  - Reducing the level of impact from planned and unplanned disruptions through improved communications and direct messaging to road users.

Key Metrics

- Journey times
- Number of unplanned disruptions
- Network utilisation

As mentioned in the Qualitative and Quantitative section, the key metrics will be linked to the way the network is used and the flow of traffic.

Commercial Case

The purpose of the commercial dimension of the business case is to demonstrate that the preferred option will result in a viable procurement and a well-structured Deal between the public sector and its service providers. Demonstrating a viable procurement requires an understanding of the marketplace, knowledge of what is realistically achievable by the supply side and research into the procurement routes that will deliver best value to both parties.

Case	**Live Labs considerations**	**First pass bulleted responses (to be completed by Live Labs)**
Demonstrating that the intervention will result in a viable procurement and attractive deal for the market	What was your procurement journey for the intervention – from specification to deployment? How did the market respond to the opportunity?	• Experimental components of the project were procured through direct award. • Some components of the project were procured through an existing supplier under their existing contract. • Other components of the project were through a competitive tender. • One component of the project was procured through a combination of direct award and competitive tender. • The market has generally responded positively. • We discovered that the WMCA was not used to the forming of partnerships with small enterprises and academic partners. This took time to resolve although new models are now available to replicate. • It took us time to create the case to secure the resources of Connected Places Catapult, which is an arms-length body of Government. Lessons could be learned from this to make it easier.

Case	Live Labs considerations	First pass bulleted responses (to be completed by Live Labs)
Implementation efficiency	How did you deliver the intervention? What lessons have been learned through delivery?	• SATC deployment was delivered via a Memorandum of Understanding with West Midlands Police and via a contracted incumbent supplier. • The data analytics was delivered by integrating the data streams from the SATCs, Inrix trip paths and Atkins/BT Cellular location, into Amazon Web Services with support from the Amazon Web Services Professional Services team. • The predictive analytics are being delivered by the University of Warwick and Immense AI based on the structured data in the Amazon Web Services Servers • The Personas were delivered by direct award to Connected Places Catapult who did a competitive tender and brought in an anthropologist and ethnographer to appraise the responses. • The benefits realisation work was delivered via a competitive tender. • Lessons learnt ○ Experimental development usually requires direct award which is discouraged in the public sector. ○ The specification to the suppliers needs to be explicit to ensure the correct product is delivered. ○ A smaller supplier is more likely to work collaboratively with a local authority when compared to larger, more established suppliers

Case	Live Labs considerations	First pass bulleted responses (to be completed by Live Labs)
Procurement strategy and delivery schedule	What lessons have been learnt with regards to procurement and market reaction?	• To take advantage of the latest technology the public sector needs to change the approach to procuring direct award companies and start-ups. • Large companies will usually try to sell the finished product and not offer access to the source data or transparency on how the data was collected.

Procurement Journey

- Experimental components of the project were procured through direct award.
- Some components of the project were procured through an existing supplier under their existing contract.
- Other components of the project were through a competitive tender.
- One components of the project were procured through a combination of direct award and competitive tender.
- The market has generally responded positively.

Due to the nature of the Network Resilience Live Lab, different parts of the intervention were procured through different processes. Some parts were procured through direct award due to the lack of viable alternatives for a given service or there was a significant time saving as an existing supplier had experience with the project. In one case this led to us procuring a supplier directly which then led to a tender process for a subcontractor where the Live Lab team were involved in the decision-making process. As this was for a service that had not been utilised by the team before, using the expertise of the main supplier helped the Live Lab team improve their skills. Many of the more experimental sections of the Network Resilience Live Lab have awarded the supplier with a limited contract which gives team members the opportunity to learn and understand the technology involved.

Some things simply could not be secured and different solutions were found. For example, our HR team did not recognise the high salary needed for a Senior Data Scientist in the team. So, we approached academia instead and secured the same resource on a partnership basis.

Implementation Efficiency and Procurement Strategy

- SATC deployment was delivered via a Memorandum of Understanding with West Midlands Police and via a contracted incumbent supplier.
- The data analytics was delivered by integrating the data streams from the SATC's, Inrix trip paths and Atkins/BT Cellular location, into Amazon Web Services with support from the Amazon Web Services Professional Services team.
- The predictive analytics are being delivered by the University of Warwick and Immense AI based on the structured data in the Amazon Web Services Servers
- The Personas were delivered by direct award to Connected Places Catapult who did a competitive tender and brought in an anthropologist and ethnographer to appraise the responses
- The benefits realisation work is being delivered via a competitive tender.

- Lessons learnt
  - Experimental development usually requires direct award which is discouraged in the public sector.
  - The specification to the suppliers needs to be explicit to ensure the correct product is delivered.
  - A smaller supplier is more likely to work collaboratively with a local authority when compared to larger, more established suppliers
- To take advantage of the latest technology the public sector needs to change the approach to procuring direct award companies and start-ups.
- Large companies will usually try to sell the finished product and not offer access to the source data or transparency on how the data was collected.

As mentioned, much of the project was procured via direct award as there were not viable alternatives to the services required and, in some cases, the identified supplier had already been working on a precursor to the project. The direct award process is generally frowned upon in local authorities and comes with additional steps and processes needed to prove the why a direct award is being made in the first place. This process becomes more difficult when procuring services from a start-up supplier with limit history and where much of their funding is provided by investments. However, the project was focused on innovative approaches to improving the KRN and these start-ups provided the innovative solutions that can be evaluated against more traditional methods. Additionally, the project has found that smaller suppliers are more seem more likely work collaboratively with the project team when compared to established suppliers who are more likely to offer an existing product or solutions which may not be tailored to the project's specific needs. As a project with innovative elements, the ability to collaborate was required as the requirements were not always known from the outset. It was found that more established suppliers were less flexible and needed exacting requirements and any deviation from these requirements came with a cost penalty.

Financial Case

The purpose of the financial dimension of the business case is to demonstrate the affordability and funding of the preferred option, including the support of stakeholders and customers, as required. Demonstrating the affordability and fundability of the preferred option requires a complete understanding of the capital, revenue and whole life costs of the scheme and of how the Deal will impact upon the balance sheet, income and expenditure and pricing arrangements (if any) of the organisation.

Case	Live Labs considerations	First pass bulleted responses (to be completed by Live Labs)
The intervention is affordable for the public sector and can be funded through a viable financial agreement	In retrospect do you deem the interventions to be affordable, if so why, if not why? If deploying again, how might you consider a structuring an at-scale package which could be attractive to the market	• The SATC deployment is affordable as the bulk of the cost is the deployment of new devices on to the network. The maintenance cost is minimal, and the network is bolstered by the addition of existing devices West Midlands Police have in place. • If deploying again, engaging with West Midlands Police earlier to develop the roll out and device access would be an improvement. • The data analytics is affordable as the bulk of the cost is the setup and development of the analytics systems. The ongoing costs are in relation to the use of Amazon Web Services servers which can be spread across multiple projects. • If deploying again, building in the capability to port the system to other cloud providers would be an improvement. • Currently the Personas are 'unaffordable' as this is a brand-new capability and there is no evidence that it will provide improved efficiency and a better service above what can be provided by the All Traveller Segmentation. However, the potential for this is highly possible. • If deploying again, recruitment of an individual with persona development experience to lead the work would be an improvement.

Case	Live Labs considerations	First pass bulleted responses (to be completed by Live Labs)
Financial model	If you were implementing again, what considerations would you make in developing your financial model for an at scale set of similar interventions?	• Timing of deployment for the various project components. • Secure seconded resources from WMCA corporate services to reduce inefficiency of raising a new support request and getting multiple colleagues up to speed on the same project.
Funding sources	Besides Live Labs funding have you levered any other funding sources (this can include contributions in kind as well as capital / revenue funds)	• Additional SATCs through the Memorandum of Understanding (MoU) with West Midlands Police. • Building the Personas on the segmentation funded by Future Transport Zone.

Affordability

- The SATC deployment is affordable as the bulk of the cost is the deployment of new devices on to the network. The maintenance cost is minimal, and the network is bolstered by the addition of existing devices West Midlands Police have in place.
- If deploying again, engaging with West Midlands Police earlier to develop the roll out and device access would be an improvement.
- The data analytics is affordable as the bulk of the cost is the setup and development of the analytics systems. The ongoing costs are in relation to the use of Amazon Web Services servers which can be spread across multiple projects.
- If deploying again, building in the capability to port the system to other cloud providers would be an improvement.
- Currently the Personas are unaffordable as this is a brand-new capability and there is no evidence that it will provide improved efficiency and a better service above what can be provided by the All Traveller Segmentation. However, the potential for this is still possible.
- If deploying again, recruitment of an individual with persona development experience to lead the work would be an improvement.

As shown in the

Approximate Costs table, a large portion of the costs are linked to the initial creation and deployment of the systems or one-off purchases. The Memorandum of Understanding with WMP is a key document in allowing efficient use of the SATC's. The deployment of new SATC's and the associated installation costs are bulk of the overall expense, while the ongoing maintenance costs are a fraction this but will scale with the number of SATC's deployed.

The analytics system creation also has the bulk of the cost in initial setup, due to the need for specialist to help with creating the system in the cloud servers while helping team members understand how to develop analytics on the cloud servers. The project did look to supplement the data collected by the SATC's with commercially available data and these have been purchased as a one off with the goal of evaluating the usefulness of this data. The ongoing cost are linked to the use of a cloud computing service which will scale with the amount of data being processed. The advantage is that the service can be used by multiple project for their processing needs and specific hardware is not purchased and underutilised for most of its life.

Currently the projects understanding of the cost of the Persona generation is fixed and currently on a biannual basis. This is in-line with the updating of the segmentation which will track the changes in demographic across the region. As this is the first time this has been done for TfWM it is the only historical cost available. However, this development was completed through a supplier to a subcontractor and the cost may be significantly lower when TfWM undertakes the task directly. Additionally, it is unknown how quickly the demographic changes take place which may allow for a longer period between Persona updates.

Financial Model

- Saving in utilising existing SATCs already in place from WMP.
- Timing of deployment for the various project components.

Title	Approx. Saving	Description
Cost Saving due to West Midlands MoU	£100,000	It is estimated that during phase 1 and phase 2 of the SATC deployment, a saving was made by West Midlands Police allowing access to the SATCs they already have in place. Further savings will be realised as more SATCs are deployed and these savings also benefit the police as they have an increased ability to view the network and support the community.

The main consideration that would be taken on to account in the future is the timing needed to complete negotiations for procurement and the deployment, especially the SATC's. During this project the COVID-19 pandemic did have an influence on delays to deployment, but several parts were possible to complete remotely and didn't require face to face interactions.

Additional Funding Sources

- Additional SATCs through the Memorandum of Understanding with West Midlands Police.
- Building the Personas on the segmentation funded by Future Transport Zone.

The additional funding sources were based on benefit in kind or extending existing capabilities. The MoU with WMP has allowed for the cost of the SATCs to be shared between the two organisations and make most use of the devices that have been deployed. it also allowed for access to existing devices, extending the coverage of the network further than first envisaged. The Personas were an extension of the work completed for the Future Transport Zone where a detailed

analysis by Experian had created a segmentation of the West Midlands population. With the segmentation as a base it was easier to create the personas that represent each group and understand the motivations of the population in greater detail.

Management Case

The purpose of the management dimension of the business case is to demonstrate that robust arrangements are in place for the delivery, monitoring and evaluation of the scheme, including feedback into the organisation's strategic planning cycle. Demonstrating that the preferred option can be successfully delivered requires evidencing that the scheme is being managed in accordance with best practice, subjected to independent assurance and that the necessary arrangements are in place for change and contract management, benefits realisation and risk management.

Case	**Live Labs considerations**	**First pass bulleted responses (to be completed by Live Labs)**
The intervention can be implemented using best practices in programme and project management	What did you do with regards to project management programming, practices and skills? In retrospect, what would you do differently?	• The bulk of the project was run with traditional project management techniques in line with Association of Project Management best practice. • The work with Amazon Web Services was completed using Agile project management techniques. • In future the two techniques would be better integrated to make progress updates more automated. • Some application of the innovation 'double diamond' approach was made when creating trials e.g. the Solihull decarbonisation campaign.
Delivery plan	Thinking back to your original pitch, how did your delivery plan differ from what you planned? What lessons have been learnt?	• Broadly the same. • We shared our learning all the way through the project, so as to bring in further feedback and constructive challenge. • We learnt that softer skills are also needed: mindset to embed change, different behaviours and skills.

Case	Live Labs considerations	First pass bulleted responses (to be completed by Live Labs)
Project management team and qualifications	In retrospect, what roles, skills and qualifications would a deliver team need to deliver this intervention at scale elsewhere?	• Project management qualification and experience (Association of Project Managers/Prince2) • Agile project management qualification and experience (SCRUM) • Cloud computing development • Data Scientist • Innovation process • Ethnographer/Sociologist • Market Research • Communications • Travel demand management (TDM) • Social media marketing/engagement

Case	Live Labs considerations	First pass bulleted responses (to be completed by Live Labs)
Benefit realisation and contract management plan	With regards to this intervention what have you do to realise benefits (internally and externally)? What lessons have you learnt from contract management (with partners and suppliers) with regards to this intervention? What would you do differently if delivering a similar package of at-scale interventions again?	• The data collected and processed is being fed back to the organisation which is used to inform decision making. • Multiple how-to guides are being developed to document how to set-up each component of the project. • Multiple higher-level client guides are being developed which outlines each of the components of the project. • A skills assessment is being undertaken, to understand the new skills and behaviours that will be needed for embedment. • Legal, Procurement and Finance functions need to be prepared for direct awards and varying contract requirements. • Ensure robust requirements for any part of the system is understood in greater detail and verified with the supplier. • Create a programme of Persona embedding as part of the Persona creation.
Ex-ante evaluation strategy	Did you undertake an evaluation of alternatives to the intervention? If undertaking a similar programme at scale, what alternatives would you consider, what scenarios might you consider them within?	• Alternatives to this system are already in use or were deemed beyond the scope of this project. • The use of CCTV to do vehicle counting is an alternative we investigated but could not complete in this project. This would be suitable for more mobile systems.

Project Management

- The bulk of the project was run with traditional project management techniques in line with Association of Project Management best practice
- The work with Amazon Web Services was completed using Agile project management techniques.
- In future the two techniques would be better integrated to make progress updates more automated.

The project management was based on the Association of Project Management best practice with elements being developed with an agile methodology. These were used for parts of the project where a technique made the most sense, i.e. using agile for the software algorithm development for the analytics engine. In the future there would be a greater effort to integrate the two techniques to allow for more fluid reporting and updating between the two.

Project Team and Qualifications

- Project management qualification and experience (Association of Project Managers/Prince2)
- Agile project management qualification and experience (SCRUM)
- Cloud computing development
- Data Scientist
- Innovation process
- Ethnographer/Sociologist
- Market Research
- Communications
- Travel demand management (TDM)
- Social media marketing/engagement

During the project it has become apparent that some specialities are needed to be included to ensure the direction of the project is maintained and capitalised on. These roles wouldn't necessarily be only for this project and could be part of the wider organisational team or brought in from a contractor, but their input would be invaluable during the development process. If these positions were recruited into the organisation it would allow for the continued development of the project outputs beyond the end of the project with a same level of focus.

Benefit Realisation and Contract Management

- The data collected and processed is being fed back to the organisation which is used to inform decision making.
- Multiple how-to guides are being developed to document how to set-up each component of the project.
- Multiple higher-level client guides are being developed which outlines each of the components of the project.
- A skills audit is being carried out to understand the new skills will be needed and training set up accordingly.
- Legal, Procurement and Finance functions need to be prepared for direct awards and varying contract requirements.
- Ensure robust requirements for any part of the system is understood in greater detail and verified with the supplier.
- Create a programme of Persona embedding as part of the Persona creation

The data that is collected via the SATCs and combined with the other data integrated by the project, to inform decision making on potential improvements to the KRN. The project has brought on a consultancy to help with the creation of the benefit realisation documentation. The advantage of the is the 'fresh eyes' approach

to reviewing the outputs of the project which can show some the additional benefits that may have been come common knowledge to the project team. Additionally, a skills audit will identity areas where skills are needed to make best use of the data being created by the project.

In terms of lesson learnt, a key place to start would be ensure the Legal, Procurement and Finance departments are informed and buy in to the innovative nature of the project, along with a process to facilitate raising orders. This would make to task of raising a direct award to a supplier smoother and facilitate quicker progress of the project while continuing the maintain the integrity of the requirements for the given departments.

Alternative Interventions

- Alternatives to this system are already in use or were deemed beyond the scope of this project.
- The use of CCTV to do vehicle counting is an alternative we investigated but could not complete in this project. This would be suitable for more mobile systems.

The alternatives to traffic monitoring systems are already in use and the solution developed as part of this project intend to be cost saving and give more information about the network. These alternatives include the use of SCOOT loops which can currently only give data on traffic flow if the traffic is moving across it and is not able to tell the difference between stop start/stationary traffic and an empty road. The difference is inferred by the time of day for the readings and it should be noted these are not permanent installations so only capture traffic patterns as a snapshot of the period they are deployed. The other alternative is the 700-point survey where vehicle counting is done by people positioned at strategic locations. This method is prone to human error and, again, is not a permanent installation or available 24/7.

A part of the project was to develop a system that could complete vehicle counting via CCTV cameras using computer vision techniques. This was stopped as part of the project as it was felt it could not be completed successfully within the project time frame but will be researched as part of another project.

Additional considerations

Political	Any wider political considerations – approvals, briefings, upskilling etc.?	• The outcomes for network customers commonly relate to a number of DfT teams and horizontal working between them and some joint objectives would help the pursuit of travel demand management (TDM).
Economic	Any further economic considerations not considered above?	• Unlocking potential of an area.
Social	Any wider social implications, benefits from the intervention or linkages with other social programmes or initiatives?	• Linkages with network safety, incidents and accidents. • Linkages with healthcare trips.
Technological	Any technological considerations in developing / deploying the intervention what could help others?	• The SATCs are based on ANPR cameras and this is being used by West Midlands Police, increasing their capability to monitor the road network of the West Midlands. • In return, West Midlands Police has been able to use the TfWM SATC for counter terrorism purposes.
Legal	Any legal considerations required particularly with respect to contracts, procurement and approvals?	• The importance of addressing ethics and GDPR in capturing customer data.
Environmental	Any wider environmental benefits / impacts not captured above?	• Support better decision making to reduce the public's reliance on car usage on the network. • Reduced idling, which can use 0.5l fuel for every hour, depending on the vehicle.