

# Funding for Innovation: Connected Vehicle Data



Department  
for Transport

## Application Form

The level of information provided should be proportionate to the size and complexity of the scheme proposed. As a guide, we would suggest around 10 to 15 pages including annexes would be appropriate.

**A separate application form should be completed for each scheme.**

### Applicant Information

**Local authority name(s)\*:** Derby City Council

*\*If the bid is a joint proposal, please enter the names of all participating local authorities and specify the lead authority*

**Bid Manager Name and position:** Kully Boden, Highway Asset Team Leader

*Name and position of officer with day to day responsibility for delivering the proposed scheme.*

**Contact telephone number:** 01332 642013    **Email address:** [kully.boden@derby.gov.uk](mailto:kully.boden@derby.gov.uk)

**Postal address:** Streetpride Depot, 15 Stores Road, Derby, DE21 4BD

When authorities submit a bid for funding to the Department for Transport, as part of the Government's commitment to greater openness in the public sector under the Freedom of Information Act 2000 and the Environmental Information Regulations 2004, they must also publish a version excluding any commercially sensitive information on their own website within two working days of submitting the final bid to the Department for Transport. The Department for Transport reserves the right to deem the business case as non-compliant if this is not adhered to.

**Please specify the web link where this bid will be published:**

<https://www.derby.gov.uk/transport-and-streets/managing-highway-assets/policy-strategy-highways/>

## **SECTION A - Scheme description and funding profile**

### **A1. Scheme name: Derby City Council: Funding for Innovation**

#### **A2. Headline description:**

Please enter a brief description of the proposed scheme (in no more than 250 words)

This project is designed to specifically test whether new advances in Computer Vision, a branch of Artificial Intelligence can be used in pursuit of cost effective asset management. Specifically we will use video imagery taken from moving vehicles, pass that into the Cloud from where Artificial Intelligence will be used to automatically detect assets and their condition.

We are not only testing Computer Vision's effectiveness in automatically identifying assets, but also looking to assess whether our own fleets can be connected in such a way as to provide continuously updating information. The goal is to ascertain whether we can utilise this information to create a new risk based approach to what we might term 'tactical asset management'. This project offers a first step in what will be a paradigm shift in the way that asset management is approached, especially for smaller authorities like our own.

Key project outcomes include an inventory of road signs on the Derby City network with imagery collected by mobile phones installed in vehicles. We will then assess whether a pre-existing installation of cameras on our refuse collection vehicles can be used for this purpose and enable this capability. Critically this connected fleet data has the potential for multiple uses as the Computer Vision capability continues to expand. We see this project as a springboard to then use our connected fleet data as an integral part of our asset management. For instance, the video imagery collected could be used to identify other asset deteriorations, such as pothole occurrence.

Working in partnership with Vaisala Ltd and ISS Ltd (Innovative Safety Systems), the project will deliver eight clear deliverables in two key stages. Full details can be found on page 12 of the annex

#### **A3. Geographical area:**

Please provide a short description of area covered by the bid (in no more than 50 words)

OS Grid Reference: SK 3518 3649 • X/Y co-ords: 435187, 336492  
Postcode: Derby citywide - DE1

Please append a map showing the location (and route) of the proposed scheme, existing transport infrastructure and other points of particular interest to the bid e.g. development sites, areas of existing employment, constraints etc.

#### **A5. Equality Analysis**

Has any Equality Analysis been undertaken in line with the Equality Duty? **yes**

## **SECTION B – The Business Case**

### **B1. The Scheme – Summary/History (Maximum 300 words)**

Please outline what the scheme is trying to achieve – .indicate what data you expect to collect and your technological approach, what applications you will deliver from the connected data etc.

This should also provide a clear statement on data privacy and security.

This proposal is designed to allow Derby City to assess the emerging technology of Artificial Intelligence, with respect to its use in asset management. The hypothesis to be tested is that automated recognition of assets on our network from video data collected from our own fleet, will introduce both efficiencies in our current operations and enable new thinking in terms of how we manage those assets. Existing technology only allows for occasional data to be produced, however within this project, we will investigate how we can utilise continuously updating information which is automatically categorising the condition of certain assets, with little or no manual intervention.

We will test the science in readiness for a more connected transport network by using what is available today in Derby City and in doing so, immediately maximise the effectiveness of our existing asset management resource.

It is the automatic identification of assets that is so appealing. The video capture will act as a base for the Computer Vision, so in work packages 1 and 3, outlined on page 9 of the annex, we will set up the necessary cloud infrastructure and use standard mobile phones mounted in our patrol vehicles to capture video of the entire Derby City road network. Computer Vision will then be trained to automatically deliver a road sign inventory, which Derby City has not been able to collect on its own to date.

This has been tested with an accuracy of automatic identification in the order of 98%.

A significant element in our proposal is to develop the anonymisation of these images to a level where tracking of individuals cannot be undertaken by anyone viewing these images after the event. It is our intention that as the images are loaded into the cloud, we will have a pre-storage phase that removes anything that could lead to the identification of an individual and their location at a particular time. We feel this solution is the most robust that can be offered and we will ensure that it is enabled early on in the project. Section 2.4 on page 5 of the annex refers.

Any awarded funding will allow us to assess an emerging technology to a level where the evidence is clear enough to inform future business decisions. This project will also inform how this can be utilised by other similar authorities in the immediate future.

### **B2. The Strategic Case (Maximum 350 words)**

This section should set out the rationale for making the investment and evidence of the existing transport problems.

In particular please provide evidence on the relevant questions/issues in the accompanying Competition guidance.

Supporting evidence may be provided in annexes – if clearly referenced in the strategic case. This may be used to assist in judging the strength of your strategic case arguments but is unlikely to be reviewed in detail or assessed in its own right. So you should not rely on material included only in annexes being assessed.

What are the current problems to be addressed by your proposal?

These are not problems necessarily, more an opportunity to work smarter and in partnership with the private sector on innovative solutions to meaningful data collection. Making use of our existing refuse fleet and CCTV equipment is a clear win on demonstrating the capability of connected data on our doorstep. With a fleet of around 40 vehicles on the highway network 5 days a week, we have more access to updated data than our traditional highway inspection frequencies could manage. With the introduction of the new risk based approach being developed, a key driver for more efficient ways of working, this provides an additional and reliable tool to Derby to identify defects, allowing manual resources to focus on other tasks. Para 2.6.2 of the annex on page 7 refers

What options have been considered and why does your approach to road condition provide the best solution?

Other video surveys are available, but do not recognise individual signs, so require manual intervention to classify and maybe even inspect. Computer Vision is fully automated, consistent and repeatable, providing a fully itemised inventory with associated condition details. Para 2.3.5 of the annex on page 4 refers

What are the expected benefits / outcomes?

Highway inspections are completed manually. Even at its lowest level the updating video that we intend to capture at the beginning of the project, will allow efficiencies to be realised. For instance, the report of a damaged road sign can easily be checked by video, rather than an inspector having to verify it onsite. We will also investigate whether this evaluation can even be undertaken by front line staff, at the time of the call. Para 2.2.2 of the annex on page 2 refers. This could be developed to also review faded or missing road markings and potholes.

What is the impact of the scheme?

Having a full inventory and condition data on the road sign asset, something we have never had at Derby City. It will contribute to a more accurate valuation of the overall highway asset. We can have a planned programme of procurement and repair, rather than reactive ad hoc repairs. It can also contribute to the removal of street clutter by identifying redundant and unnecessary signs. Finally, it will showcase the pioneering work of private successful SME's in the management of highway assets, something that can be developed for other assets and shared with other local authorities.

### B3. The Financial Case – Project Costs

Before preparing a scheme proposal for submission, bid promoters should ensure they understand the financial implications of developing the scheme (including any implications for future resource spend and ongoing costs relating to maintaining and operating the asset), and the need to secure and underwrite any necessary funding outside the Department for Transport's maximum contribution.

Please complete the following tables. Figures should be entered in £000s (i.e. £10,000 = 10).

**Table A: Funding profile (Nominal terms)**

£000s	2018-19	Total
DfT Funding Sought	40	40
LA Contribution	5.136	5.136
Other Third Party Funding	7.348	7.348

Notes:

- (1) Department for Transport funding must not go beyond 2018-19 financial year.
- (2) A local contribution of 5% (local authority and/or third party) of the project costs is required.

### B4. The Financial Case - Local Contribution / Third Party Funding

Please provide information on the following points (where applicable):

- a) The non-DfT contribution may include funding from organisations other than the scheme promoter. Please provide details of all non-DfT funding contributions to the scheme costs. This should include evidence to show how any third party contributions are being secured, the level of commitment and when they will become available. See appended letter from Vaisala dated 12 February, indicating an in-kind contribution. A letter from ISS dated 15 February outlining support for the project is also appended. These would both be available on receipt of a successful bid.
- b) Where the contribution is from external sources, please provide a letter confirming the body's commitment to contribute to the cost of the scheme. The Department for Transport is unlikely to fund any scheme where significant financial contributions from other sources have not been secured or appear to be at risk.

Have you appended a letter(s) to support this case?      Yes

- c) Please list any other funding applications you have made for this scheme or variants thereof and the outcome of these applications, including any reasons for rejection. N/A

#### **B5. The Financial Case – Affordability and Financial Risk (maximum 200 words)**

This section should provide a narrative setting out how you will mitigate any financial risks associated with the scheme.

Please provide evidence on the following points (where applicable):

- a) What risk allowance has been applied to the project cost? the project costs are of course our best estimate, however we have ensured that it includes flexibility in the following areas:  
1) equipment costs have been slightly expanded in the roll out phase to allow a fall-back position of deploying more mobile phones, should the fleet cameras prove not to be suitable. If however they are suitable, this money could be transferred to more fleet camera modifications. 2) our partners Vaisala have quoted for a significant number of development hours which they intend to use to improve the computer vision techniques. This is the greatest unknown in terms of effort, but this allocation includes error margins. Vaisala have allocated a specific number of development hours to the urban sign recognition algorithm, but have also included a contingency number of hours should the process be more complicated than expected. The unknown surrounds the visible clutter likely in the city environment and how the existing methodology will cope with this. If the sign recognition is indeed more complicated, then there is enough contingency to be able to overcome this. On the other hand if this contingency is not required, we will then as stated in Appendix A look to utilise the video capture to start identification of road surface defects.
- b) How will cost overruns be dealt with? we will closely control spending by ensuring that orders to our partners are raised with specific deliverables, thereby transferring risk to the private sector partners. Nevertheless as a partnership, we will do so with mutual agreement and within sensible boundaries already laid out in the work programme, which has been agreed by all parties in advance of this bid being submitted.
- c) What are the main risks to project delivery timescales and what impact this will have on cost? we have the ability to call a halt to proceedings and then assess the outcomes to enable some form of ongoing service, based on how far we have been able to proceed with each element of the project. We feel project overruns are highly unlikely and hence we will be able to

deliver the project within the stated funding boundaries.

#### **B6. The Economic Case – Value for Money (maximum 200 words)**

Bidders are requested to provide qualitative description of the data that will be collected from the project and how these could provide potential benefits going forward.

This should also capture any examples which generate revenue from the data collected and an indication on the number of users that benefits

The data collected will provide a full inventory of signs by classification and condition and provide a tool for ongoing condition monitoring and works programming. A full inventory will also assist in lifecycle planning and asset valuation.

Potential benefits include a reduction in public enquiries and un/necessary highway inspector visits to site. Dangerous defects identified, either from the video survey or from the RCV cab could also be diverted straight to a gang for repair, saving time and unnecessary delays

Later stages of the project could potentially generate revenue by sharing anonymised imagery and data with other asset owners, utility companies and public transport providers. It is difficult to say at this stage the numbers of users that could benefit, but instant savings in revenue would be achieved by saving x6 Inspectors time and benefits to the public in efficient use of council resources.

#### **B7. The Commercial Case (maximum 200 words)**

This section should set out the procurement strategy that will be used to select a contractor and, importantly for this fund, set out the timescales involved in the procurement process to show that delivery can proceed quickly.

What is the preferred procurement route for the scheme? For example, if it is proposed to use existing framework agreements or contracts, the contract must be appropriate in terms of scale and scope.

\*It is the promoting authority's responsibility to decide whether or not their scheme proposal is lawful; and the extent of any new legal powers that need to be sought. Scheme promoters should ensure that any project complies with the Public Contracts Regulations as well as European Union State Aid rules, and should be prepared to provide the Department for Transport with confirmation of this, if required.

An assurance that a strategy is in place that is legally compliant is likely to achieve the best value for money outcomes is required from your Section 151 Officer below.

The two suppliers we are collaborating with on this project are Vaisala and Innovative Safety Solutions (ISS), both of which are existing suppliers to Derby City Council and are successful SME's with track records of delivery. ISS provide the vehicle CCTV system for our refuse and highways fleets and Vaisala provide our Road Weather Information System and Winter Decision Support System

However, neither contract covers the type of work that is included in this application. To the best of our knowledge, this type of approach has not yet been trialled within the UK. Therefore, if successful, a contract waiver will be applied for as per the procedures contained within our Contract Procedure Rules, to enable these companies to work together and deliver the project. This would require sign off by either the Council Cabinet or the Director of Legal and Democratic Services. Given the amount of funding we are requesting, we are well within EU Procurement Thresholds.

The relevant departments within the Council are aware of this bid and are supportive of getting the necessary approvals in place, should the bid be successful.

### **B8. Management Case - Delivery** (maximum 200 words)

Deliverability is one of the essential criteria for this Competition and as such any bid should set out if any statutory procedure are needed before it can be delivered.

- a) An outline project plan (typically in Gantt chart form) with milestones should be included as an annex, covering the period from submission of the bid to scheme completion. The definition of the key milestones should be clear and explained. The critical path should be identifiable and any contingency periods, key dependencies (internal or external) should be explained.

Has a project plan been appended to your bid? **Yes – Annex B, page 11**

- b) A statement of intent to deliver the scheme within this programme from a senior political representative and/or senior local authority official. **Yes - appended**

### **B9. Management Case – Governance** (maximum 300 words)

Please name who is responsible for delivering the scheme, the roles (Project Manager, SRO etc.) and set out the responsibilities of those involved and how key decisions are/will be made. An organogram may be useful here. This may be attached as an Annex.

The Project Manager is Kully Boden, Highway Asset Team Leader. Kully will oversee day to day management of the project, including overseeing the procurement as highlighted in B7. Regular fortnightly teleconferences with both Vaisala and ISS will manage progress of the project. Kully will report to the Programme Monitoring Group on any financial matters, risks and issues arising. The Programme Monitoring Group oversee all highways and transport capital projects and report any changes and risks to Infrastructure Board for senior decision making and approvals.

The Senior Responsible Owner is David Kinsey, Head of Highways and Grounds Maintenance and a member of Infrastructure Board, along with other heads of service, directors and Finance Lead Officers. He will have responsibility to make programme decisions, in line with delegated authority and in consultation with Cabinet Members.

Infrastructure Board manage all capital and grant funded schemes and programmes. They have a general overview of the delivery of related work programmes and provide strategic direction and coordination of resources. They ensure all risks are managed and projects are delivered in line with financial and procurement procedure rules. Should this bid be successful, the project would be reported upon on a monthly basis.

An organogram is included in Annex C - page 12

### **B10. Management Case - Risk Management**

Risk management is an important control for all projects but this should be commensurate with cost. A risk register covering the top 5 (maximum) specific risks to this scheme should be attached as an annex.

Has a risk register been appended to your bid? **Yes – Annex D, page 13**

## **SECTION C – Monitoring, Evaluation and Benefits Realisation**

### **C1. Benefits Realisation (maximum 250 words)**

The Competition is seeking to build up the business case for the relevant technologies and use cases. Please provide details on the profile of benefits, and of baseline benefits and benefit ownership and explain how your will lead to the outputs/ outcomes. This could be achieved by logic maps, text descriptions, etc.

Please see Annex E - Benefits Realisation Logic Map on page 14

We also request that your bid clearly articulates how you are expecting to use the data collected and the expected benefits for both road users and road operators. Please also outline how you could measure the expected benefits from the application of the harvested data.

Expected benefits could be measured by a reduction in public enquiries, an increase in work generated by video survey (therefore demonstrating the accuracy and reliability of this data collection method) and maybe even through public satisfaction surveys, both locally and the NHT survey.

### **C2. Monitoring and Evaluation (maximum 150 words)**

The Department intends to evaluate the competition and bidders are requested to support our evaluation activities through the provision of information. For example, we may ask you to complete a survey or take part in an interview. In particular we will be interested to gather your views on; the delivery process (e.g. Have you delivered your proposal to cost and schedule and whether you have encountered any barriers to delivery); the technology implemented (e.g. did it work as intended); the data collection process (e.g. do you have confidence in the data collected?); and how the data has been used/how are you planning to use it?

All work completed to date with Vaisala and ISS has been to exceptional standards, with technology proving to provide many efficiencies and savings. With the good working relationships, we see no reason why working together on a new venture will not succeed.

The Norwegian Public Road Administration tested the road sign recognition service in 2016/17 and concluded that accuracy of automatic identification was in the order of 98%. Work has also been conducted for the Finnish Transport Agency, who have also taken a keen interest in this emerging technology. The image recognition and identification of road signs being marketed at such a high percentage gives us confidence in this bid. Derby City recently viewed a compelling demo of road cracking identification, all from just one mobile phone video. Albeit a prototype, it demonstrated the power Computer Vision has to recognise and position assets on the network.



## **SECTION D: Declarations**

### **D1. Senior Responsible Owner Declaration**

As Senior Responsible Owner for our bid for Funding for Innovation, I hereby submit this request for approval to DfT on behalf of Derby City Council and confirm that I have the necessary authority to do so.

I confirm that Derby City Council will have all the necessary powers in place to ensure the planned timescales in the application can be realised.

Name:

David Kinsey

Position:

Head of Highways and Grounds Maintenance

Signed:



### **D2. Section 151 Officer Declaration**

As Section 151 Officer for **Derby City Council**, I declare that the scheme cost estimates quoted in this bid are accurate to the best of my knowledge and that **Derby City Council**

- has allocated sufficient budget to deliver this scheme on the basis of its proposed funding contribution
- will allocate sufficient staff and other necessary resources to deliver this scheme on time and on budget
- accepts responsibility for meeting any costs over and above the DfT contribution requested, including potential cost overruns and the underwriting of any funding contributions expected from third parties
- accepts responsibility for meeting any ongoing revenue requirements in relation to the scheme
- accepts that no further increase in DfT funding will be considered beyond the maximum contribution requested
- has the necessary governance / assurance arrangements in place
- has identified a procurement strategy that is legally compliant and is likely to achieve the best value for money outcome
- will ensure that a robust and effective stakeholder and communications plan is put in place.

Name:

Don McLure

Interim Strategic Director of Corporate Resources

Signed:



16/2/18

### **Submission of bids:**

The deadline for bid submission is **23.59 on 16 February 2018**.

An electronic copy only of the bid including any supporting material should be submitted to:  
**TRAFFIC.COMP@dft.gsi.gov.uk**

