Transport Location Data Competition

Geospatial Commission

Foreword by Commissioner Dr Steve Unger

The Transport Location Data Competition has stimulated the rapid prototyping of many innovative geospatial solutions, developed by the companies that have participated in the competition.

Data-driven innovation is fundamental to many sectors of the economy, but no sector demonstrates this more clearly than transport. There are many real-world challenges which can be addressed given access to the right data, and development of new data analytic techniques. This creates a real opportunity for businesses to develop new services. As a result, we will all benefit from transport networks which are easier to use, more efficient, healthier, safer and greener.

The ingenuity and inventiveness of the proposals submitted to the competition has been impressive. We received over 200 submissions proposing different ways in which location data can be exploited to solve transport challenges. We funded 28 projects to develop the initial idea into a proof of concept. We have provided additional support for seven of the most commercially viable projects, to help bring these ideas to market.

I would like to thank our delivery partner, Innovate UK, and congratulate the businesses who have used this competition to advance their ideas. They are a real testimony to the quality of the participants in the competition and they demonstrate what can be achieved if we harness the power of location data.

Simon Edmonds
Chief Business Officer
Innovate UK

The aim of the Transport Location Data Competition was to stimulate the development of geospatial solutions, which can be used to help solve major transport challenges such as: the need to integrate transport modes, enable safe active travel, enhance our supply chains and increase the efficiency of our transport networks. Industry's response to the competition demonstrated significant appetite, with ambitious and innovative project applications.

As the Innovate UK Transport Vision 2050 references, a connected, sustainable transport ecosystem aligned with new business models is essential to transform the transport sector. This in turn will advance new opportunities for economic growth and societal benefit.

We recognise the need for innovative geospatial technologies, spatial data applications, routing systems, monitoring systems to develop the connected transport sector. With an ever increasing need to understand where vehicles are, how people are travelling and asset management, the connection between transport and geospatial industries will continue to evolve and grow, driven by innovation.

It has been a huge honour to partner with the Geospatial Commission on this exciting programme and we look forward to the innovative solutions being developed further in the future.

CITY SCIENCE
endless possibilities

National Freight Model - Advanced modelling to improve the understanding of freight movements within Great Britain

City Science

City Science is an SME with a core mission to support the decarbonisation of transport and energy systems. They have built a team of thought leaders in sustainable transport, energy use, climate change, data science, software development and finance to respond to the needs of their clients in government and the private sector addressing the challenges of decarbonisation.

It remains clear to the founders of City Science that the transition to a sustainable, decarbonised economy will require new ways of thinking and evidence to guide that journey. Therefore, the City Science team engages in innovation and research to develop the tools and methods which bring rigour to the advice they provide to their clients. Prior successes include the development of their award-winning visualisation software, Cadence, and completion of the Department for Transport's Zero Emission Road Freight competition.

Their previous clients include the Department for Transport, National Highways and England's Economic Heartland. As an SME, they demonstrate enhanced levels of flexibility and attention to the needs of their clients. Through instilling this, their clients repeatedly put faith in City Science to produce credible, innovative and robust outputs.

National Freight Model

City Science have developed a cutting-edge software tool - the National Freight Model. The tool supports government and industry by providing the critical geospatial information required to decarbonise the freight system and improve its efficiency. Improving freight efficiency could contribute to adding potentially tens of billions of pounds to the economy and reduce UK annual carbon emissions by 4%.

By leveraging cutting-edge technology to statistically fuse a wide range of geospatial datasets, the tool displays freight information for 640,000 routes, 16 cargoes and 5 vehicle types. This substantially enhances the detail with which the freight system can be analysed during planning and operational decision making processes.

Laurence Oakes-Ash
CEO

Bob Hickish
Senior Consultant

Contact

Broadwalk House
Clockwise
Southernhay
West Exeter
EX1 1TS

info@cityscience.com

cityscience.com

@CityScienceUK

City Science

ZERO
by **DYNAMON**

ZERO - An AI tool to help commercial fleets adopt the optimum zero-emission vehicles and charging infrastructure

Dynamon

Dynamon is transforming the commercial transport industry to a sustainable future with smarter fleet procurement. Dynamon's tools enable fleet procurement teams to precisely forecast the performance of different vehicle technologies within their specific operations to identify the optimum solutions that minimise cost and environmental impact.

Built on advanced data analytics and AI, Dynamon's tools combine and process fleet telematics data and product performance data to provide accurate, meaningful fleet specific procurement insights.

Fleets using Dynamon's tools are empowered to make informed optimal procurement decisions that can help make their businesses more competitive, resilient, and better for the environment.

ZERO

Dynamon has developed a web-based data analytics tool, called ZERO, which helps commercial transport companies optimise their transition to zero-emission vehicle (ZEV) fleets. ZERO enables fleet teams to identify the optimum ZEVs and charging infrastructure based on their unique operation and depot electricity constraints. Insights provided by ZERO significantly de-risk the transition to ZEV fleets and can help accelerate the phasing out of fossil fuel vehicles in commercial transport operations.

ZERO works by combining geospatial datasets (fleet telematics data, terrain data, weather data, traffic data, charge point data) with ZEV performance data obtained from Dynamon's industry leading ZEV testing program. ZERO can forecast real-world ZEV performance within specific fleet operations and identify the required charging infrastructure to ensure a ZEV fleet can perform the same operation as a previous internal combustion engine fleet.

ZERO will make it significantly easier and less financially risky for fleets to transition to ZEVs, by enabling fleet procurement teams to identify the optimum, most cost-effective solutions for their operations therefore reducing the need for extensive trials of ZEV solutions and minimising the risk of poor investments.

Angus Webb
CEO

angus@dynamon.co.uk

Contact

2 Venture Road
Southampton
SO16 7NP

🌐 dynamon.co.uk

🐦 @dynamonanalytic

in Dynamon

▶ Dynamon

Emu Analytics

MANTIS - An AI-powered Digital Twin solution that predicts future shipping patterns to aid maritime navigation strategy and offshore renewables planning

Emu Analytics

Emu Analytics is a UK-based micro-SME specialising in geospatial analytics and visualisation software solutions. Its digital twin solution, Flo.w, is designed to analyse big, fast, continuous and often real-time geospatial data, which is derived from transport systems, big networks, smart cities, IoT (Internet of Things) sensors and much more.

Emu's software has been implemented for several organisations across multiple sectors, including British Airways, Transport for London, EDF Energy, Vodafone, Transport for Wales and the Civil Aviation Authority.

Marine ANalyTics Intelligence System (MANTIS)

Marine ANalyTics Intelligence System (MANTIS) is a solution based on Flo.w, created for a challenge posed by the General Lighthouse Authority (GLA). As the providers of maritime navigational services in UK waters (along with the Northern Lighthouse Board, Irish Lights and Trinity House), the GLA needed an analytical capability that could predict the movement and behaviours of future shipping in and around the UK, as the expected increase in offshore renewables introduces a greater number of marine obstacles.

MANTIS continuously analyses and visualises millions of vessel location points and movements, both historically and in real-time. Using Emu's innovative geospatial and machine learning techniques it can perform predictions of changes to future shipping routes if new user-specified obstacles are simulated.

The solution places these powerful capabilities directly into the hands of technical and non-technical personnel alike. It brings together all the complexity of historic, real-time and predictive data into a highly intuitive and easily accessible platform that allows users (who may be Planners, Operational Staff, Marine Evidence Managers, Risk Assessors, Sustainability Analysts and more) to rapidly and efficiently assess the impacts of proposed future wind farms.

Richard Vilton
CEO & Co-Founder
richard.vilton
@emu-analytics.com

Roy Davies
Co-founder
roy.davies
@emu-analytics.com

Contact

133 Whitechapel
High Street
London
E1 7QA

emu-analytics.com/

@emu_info

Emu Analytics

HackPartners

Delorean - A tool that uses track circuit sensor and location data to increase the capacity and efficiency of the rail network without compromising safety

HackPartners

HackPartners build cutting-edge technology products that help improve: asset management, operational performance, track worker safety and the quality of passenger information within the rail and bus industries.

They build their own products and also collaborate with industry partners to build bespoke and highly specialised products using their expertise in video analytics, computer vision, deep learning, statistical analysis and information visualisation.

They have developed over 10 innovative systems in this way, which are in operational use with the likes of Network Rail.

Delorean

"We want our trains to run on time" – This is the very first sentence that you can read in the Williams-Shapps Plan for Rail from May 2021. With that in mind, HackPartners built Delorean, a full featured dashboard that:
- Automatically attributes the most probable causes of lateness for every train, for any lateness values – including below the sub-threshold (three minutes) lateness, which is currently not easily attributed by performance teams
- Models how the lateness propagates through the network and causes reactionary delay
- Quantifies how Temporary Speed Restrictions affect the network performance

To enable the above they have developed innovative datasets and modelling techniques, including but not limited to:
- Automatic Signal Aspect Inference from train movement data
- Network Graph, an up-to-date digital twin of the physical Network showing how assets are connected to each other at the track circuit level
- The first timetables at the track circuit level

The output is a high resolution of train movement on the Great Britain rail network and a suite of analytics to provide data-driven intelligence on lateness to performance teams.

Haydon Bartlett-Tasker
Managing Director

Contact

ARK Coworking
237 Pentonville Road
London
N1 9NG

hello@hackpartners.com

hackpartners.com

@hackpartners

Hack Partners

ngenius.ai

Digital Active Travel Augmentation - A software solution using anonymised location data from CCTV cameras to help local authorities manage active travel routes

ngenius.ai

ngenius.ai

ngenius.ai is a technology start-up deploying cutting-edge AI, which uses existing CCTV hardware to provide novel, advanced traffic and active travel monitoring data.

They believe in the power of data to transform the places that we call home. Through their innovative approach, they provide access to the data that empowers smart cities to make faster, more accurate and more impactful decisions that can improve the lives of residents across the country.

Digital Active Travel Augmentation

ngenius.ai have embarked on a six month project to work with local authorities across the UK to provide them with insights into local active travel and drive higher active travel participation.

They have developed a software solution which provides 24/7, real-time traffic and active travel monitoring across smart cities, without the need for any additional hardware. The solution also demonstrates that this insight could be used to drive more effective decision making and ultimately support residents to participate in active travel.

Through this project, negenius.ai have worked with seven local authorities to develop, trial and test their technology and to prove that this data can have a significant impact on travel and wellbeing.

Their technology can provide insights that local authorities need to design and deliver targeted changes that make cycling and walking easier and safer for everyone.

Linford Bacon
CEO

linford.bacon
@ngenius.ai

Contact

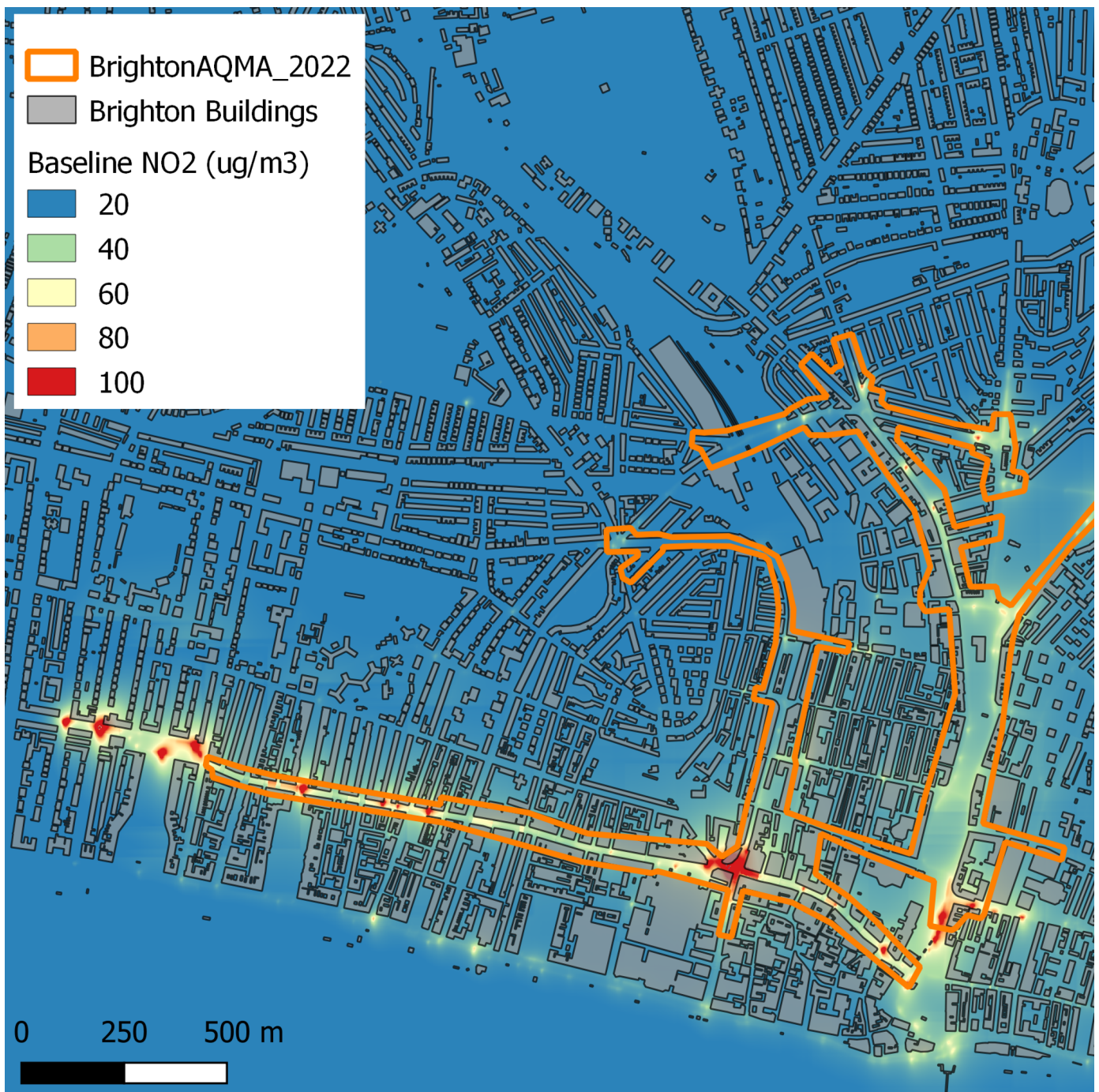The Enterprise Centre
Norwich Research Park
Norwich
NR1 2PJ

🌐 ngenius.ai/

in ngenius.ai

Optimising Geofencing - A project to increase the usage and effectiveness of low emissions zones for air quality improvements

Ricardo

Ricardo plc is a global environmental and strategic engineering consultancy. With more than 100 years of engineering excellence, Ricardo provides technical expertise in delivering cross-sector sustainable solutions to solve their clients' most complex, strategic and operational challenges – all to create a safe and sustainable future.

Ricardo works across automotive, rail, maritime, aerospace and defence, energy and the environment, and has industrialisation and production capability. Ricardo delivers: technologically advanced solutions that enable access to clean air and water; cross-sector engineering solutions to accelerate decarbonised transportation; innovation to support global net zero and industry agendas; and comprehensive expertise in safety, assurance and certification.

Optimising Geofencing

Geofencing is where a vehicle's location is used to change its behaviour. The focus of this project was to use the electric range of hybrid vehicles in the best possible way to have a positive impact on urban air quality. The project demonstrated how geospatial data can be used to reduce emissions from existing geofenced buses, enable geofencing on other hybrid vehicles and optimise geofencing plans for better air quality through integrated traffic and air quality simulation.

Through geospatial optimisation of vehicle usage, flexible zones were applied to the geofencing buses that are run by the local authority partner and these zones then change depending on passenger loading, route topology and traffic conditions. The results showed a 30% improvement in air quality due to the effectiveness of geofencing which is a similar improvement to that delivered by bus lanes but without the cost of implementing them.

In addition, a smartphone app and data platform have been developed to enable geofencing on existing hybrid passenger cars, such as those used by private hire fleets. The fleet trial demonstrated that it could significantly influence the use of electric mode and showed 10% nitrogen oxide (NOx) reductions and 23% particulate emissions reductions within the geofence zones.

Joshua Dalby
Chief Engineer, R&D

joshua.dalby
@ricardo.com

Contact

Shoreham Technical Centre
Shoreham-by-Sea
BN43 5FG

🌐 ricardo.com/

🐦 @RicardoGroupplc

in Ricardo plc

▶ RicardoGroup

THALES

Automated Rail Geospatial Observation System - A trainborne sensor and position system to detect track geometry faults and aid fault rectification to improve railway capacity

Thales

Thales are a multinational company that designs and builds rail, road and urban transport solutions that meet the infrastructure needs of tomorrow. Whether it is increasing the capacity of a network, improving the safety of passenger journeys or helping operators to save costs, Thales work to solve their customers' biggest challenges.

Thales UK has an advanced Research & Development department, responsible for exploring and trialling new technologies for the rail industry.

Automated Rail Geospatial Observation System (ARGOS)

The Automated Rail Geospatial Observation System (ARGOS) is Thales' proposed position based identification tool, capable of identifying track geometry faults. The solution uses Thales' Next Generation Positioning System to identify track geometry faults, improving the way infrastructure managers monitor the railway.

Thales have accelerated the development of the ARGOS solution, by fitting the system on a Great Western Railway Class 150 train and undertaking advanced data analysis which is required for software development. Thales have researched the detection of Cyclic Top, Dip and Twist faults using Inertia Measuring Unit data from the fitment.

Guilherme Beirao
Solutions Architect &
Technical Lead

in guilhermebeirao

Contact

4 Thomas More Square
Thomas More Street
London
E1W 1YW
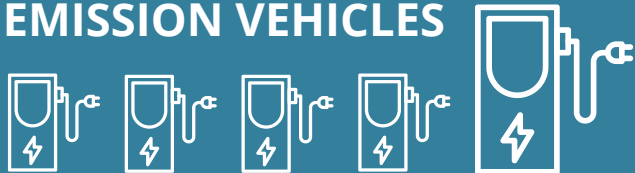
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🐦 @ThalesTransport

in Thales
Transport

The Transport Location Data Competition in numbers

DYNAMON HAS IDENTIFIED

4.9M km

DRIVEN EACH DAY BY LARGE FLEETS THAT COULD TRANSITION TO ZERO EMISSION VEHICLES

76%

OF RAIL GEOMETRY FAULTS COULD BE IDENTIFIED EARLIER BY THALES' AUTOMATED RAIL GEOSPATIAL OBSERVATION SYSTEM

RICARDO'S GEOFENCING APP COULD REDUCE HYBRID CAR EMISSIONS BY

23%

UP TO £20M PER YEAR

COULD BE SAVED BY LOCAL GOVTS ON MANUAL SURVEYS THROUGH NGENIUS' TRAFFIC SURVEYING SOFTWARE

£2.4 million

COULD BE SAVED EACH YEAR BY USING HACK PARTNERS' DELOREAN DASHBOARD TO REDUCE TIME SPENT INVESTIGATING RAIL DELAYS