Harnessing quasi real-time data for improved transport outcomes

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Introduction

Quasi real-time data (used in a window of 3-60 minutes after its collection) is a developing field, sometimes undistinguished from real-time data. In the project 'Use of quasi real-time data in transport infrastructure', part of the DAFNI-Data Infrastructure for National Infrastructure programme, a research team explored how this type of data is currently utilised and the challenges surrounding its use.

The project aimed to better understand the operational environment, challenges and best practices associated with quasi-real-time data, and to identify barriers to the acquisition and effective use of this type of data for land transport modes such as cars, lorries and public transport. The impacts are broad, ranging from quickly informing consumers about bus and tram waiting times, to enabling more dynamic traffic management.

Who's involved?

Dr Giuliano Punzo, Lecturer at the School of Electrical and Electronic Engineering & Director of the Sheffield Urban Flows Observatory and Toby E Willis, PhD student at the School of Electrical and Electronic Engineering at the University of Sheffield; Professor Daniel Coca, Head of School of Engineering, Newcastle University.

When did the project start and finish?

The project started in July 2024 and completed in February 2025.

Key challenges this project seeks to solve

Conversations around quasi real-time transport data are often hindered by inconsistent terminology. The project found that while stakeholders interviewed - including national infrastructure providers, transport data producers and consumers - regularly use this type of data, they rarely label it explicitly as 'quasi real-time data'.

Another significant challenge relates to the wide variety of sensors and software used to generate the data, from urban traffic sensors, in-vehicle GPS and smart systems. Finding people with the right expertise and skills to analyse and manage this complex data is also a current challenge.

What was the key aim of the project?

The key aim of the project was to advance research into near real-time transport data, supporting smarter infrastructure systems and enabling real-time responses to events such as accidents, delays and infrastructure failures.

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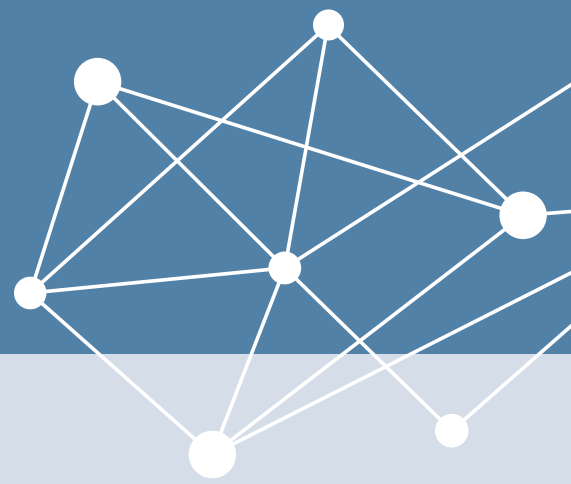
What did the project involve?

The team carried out a literature review and held interviews, followed by open-ended discussions with stakeholders from national transport providers. They identified five major types of challenge technology, cultural, legal, commercial, and security. The interviews and discussions helped develop an understanding of the difficulties posed in each of these areas.

The boundaries between these categories often overlapped, making challenges difficult to define. For example, cultural norms might influence how organisations respond to security concerns while GDPR-related issues, though fundamentally legal, are often interpreted as rigid legal barriers, even when compliant solutions may be possible.

What outputs from the project will you share?

Findings were shared at the DAFNI-DINI Showcase on 12 March 2025 and will continue to be disseminated at future research community events.

The project report outlines data owners and data types, the terms of data-sharing agreements, and how data is shared (e.g. time batches or via real-time APIs).

How do you anticipate other researchers, policymakers and stakeholders using this work?

The project report serves as a valuable resource for researchers, policymakers and practitioners. It includes practical insights from interviews with national transport stakeholders, knowledge that can often be siloed between regions or authorities. For example, each regional authority within the UK has its own transport manager but it can be difficult to connect and have information transferred between them.

The report offers a state of the art review for near real-time data that can serve as a valuable reference for future research. It also establishes a unified terminology to support clearer communication among stakeholders.

The report is intended to inform the work of the Department for Science, Technology and Innovation (DSIT) through the DAFNI-DINI Project, ensuring the research reaches policymakers at the forefront of UK's data strategy.

A wide range of users, including local and central government, GPS system providers, town planners, vehicle manufacturers, and transport planners, will be able to draw on the findings to advance the development of more resilient traffic-sensing infrastructure, particularly in light of the growing use of connected vehicles.

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What would you identify as the main impact of this work?

The project found no one-size-fits-all solution but some strategies are more effective than others.

Contrary to expectations, standardisation is not always ideal. Diverse data-sharing methods and formats can enrich the ecosystems, offering resilience and flexibility.

Rather than centralising all the data into one repository, the findings suggest supporting interoperability between repositories moving towards a confederated model of data systems.

How could this work benefit society as a whole?

More effective use of quasi real-time transport data has the potential to deliver significant benefits for local and central government, transport operators, emergency responders and the general public.

By enabling faster responses to changing conditions, such data can help reduce the time spent in traffic, lower emissions, improve infrastructure efficiency, and boost public confidence in public transport services, ultimately supporting more sustainable and economically viable public transport systems.

It also provides emergency planners to dynamically reroute traffic, resulting in smoother journeys for all road users.

Next steps

Dr Punzo and the team welcome collaboration with other research projects in related areas and are keen to extend the conversation around national policy implications for quasi real-time transport data

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