Every journey starts with a walk.

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The Right Mix agenda, part of Manchester's 2040 transport strategy aims to achieve a rate of 50% of all journeys being on foot, on cycle or on public transport by 2040. Among a variety of initiatives, TfGM have teamed up with TRL Software to roll out the first of its kind Active Travel component for its UTC (Urban Traffic Control) traffic management software, as part of the DfT signal maintenance and innovation fund. In a presentation TRL Software, with the support and collaboration of TfGM, will share insights on the opportunities this technology will provide to support realising Manchester's 50% target, and how open data is a critical key to unlocking this door.

Introduction

The title of this article is a somewhat more prosaic riff on a classic 6th century Chinese proverb ascribed to the philosopher Lao Tzu, that says "*a journey of a thousand miles begins with a single step*". Meaning that all significant achievements start with an initial action which is often the hardest step to take but is always the most important as it shows commitment to a transformative journey. In this case the transformation being sought is the transition of our urban environments from a place where 'the car is king' to one where non-motorized modes of active travel co-exist comfortably and safely alongside motorized, and where these two often conflicting forms of transport actually complement each other for the benefit of all road users. What is also implied by the title of this article is that for active travel to become a normalized and natural feature of our urban spaces, where it forms a primary function in all journeys, it needs to be encouraged and prioritized in a collaborative manner.

Urban authorities across the UK and globally are under increasing pressure to address the challenges of increased population growth in our towns and cities, with its impact on air quality, personal wellbeing and road network efficiency and safety, often within the constraints of stagnant or decreasing budgets. The introduction of ambitious but wholly necessary policies and programmes to deal with these issues, means that authorities are looking for continuously innovative and increasingly smarter solutions – none more so than Transport for Greater Manchester through the delivery of the Bee Network.

One of the major goals of the Bee Network, as with similar campaigns across the globe, is to change the instinctive behaviour of travellers in Manchester by encouraging people out of private cars and on to active travel modes of transport. One key way of achieving this is to increase the attractiveness, reliability, and ease of use of the active travel options and place the needs of active travellers at the heart of how the network is designed, built and managed.

Key Data Inputs for Active Travel Prioritization

Being able to make the right investment choices that ensure the best outcomes for the outlay, relies not only on the expertise and experience of the decision makers, but also on a clear and accurate set of facts and data. Understanding why, how, and when people make journeys in the urban space is key to being able to make the changes needed to encourage the take-up of active travel modes.

A joint TfGM and TRL project use a combination of newly installed pedestrian detectors connected to TRL's UTC and SCOOT®7 software to introduce reactive pedestrian prioritization at around 20 junctions across Manchester in the Ancoats, Didsbury and Cheetham Hill regions. These locations have been chosen to address Manchester City Councils challenges around pedestrian journeys, and also considering the varying environments, to fully test the capability of Pedestrian SCOOT. Pedestrian SCOOT in Ancoats will assist increasing accessibility across the very busy ring road North and South of City centre Manchester with major city centre to residential links. This includes crossing points for common walking routes for sporting and entertainment events such as the Etihad stadium and campus. Didsbury presents a neighbourhood environment and Pedestrian SCOOT will assist increasing accessibility in the vicinity of schools and Metrolink, either side of a busy 'A' road. These three regions all experience high pedestrian footfall and a concentration of community, retail, and leisure activities, all in close proximity to major roads and city connections.

Pedestrian volumes at the selected locations is relatively high and this aligns with the functionality of pedestrian SCOOT and the aim of priority to being given to pedestrians at sites where the pedestrian demand warrants it. Where there are large numbers of pedestrians waiting to cross the green man invitation period (and hence the overall time available to pedestrians to cross) can now be extended.

Monitoring and evaluation is an essential focus of the project as TfGM want to understand the benefits of Pedestrian SCOOT and how the customer experience and customer journey are being improved. This will assist feeding into wider Active Travel agendas and scaling up the deployment across Greater Manchester. A mix of existing sensing technology (Bluetooth JT sensors and Automatic Traffic Counters), new infrastructure (pedestrian detection) open data like Waze and STRAVA and existing SCOOT plus SCOOT 7 will be utilised.

Below is an indication on how we will carry out the monitoring and evaluation:

*	**Measure** (unit)	**Evaluation**	**Better Different Worse**
Route	Journey time - JT *(seconds)*	Journey time variability	Consistent JT is better
Junction	Pedestrian delay *(seconds)*	Cumulative delay and delay savings	The higher the cumulative delay saving the better.
Junction	Junction Saturation *(% degree of saturation)*	% of time at or below target saturation level	> Sat target = over saturated. =< Sat target = better
Junction	Max Queue Length *(vehicle/s)*	Length of queues at each junction	Shorter / less frequent queues are better
Junction	Vehicle delay *(seconds)*	Cumulative delay and delay savings	Lower delay is better

Traditional on-street detection remains a critical and widely available origin of data, but the industry continues to look for alternative and more innovative ways of determining what is happening on the network and how to plan tactics and changes to meet new demands and influence the way our roads are used. As an example, TRL are integrating data from the Strava health and fitness tracking app. Strava anonymously records user's journeys and methods of travel, building up a picture of the density, timing and flow of walkers, runners and cyclists across the urban network and the changes to those patterns over time. The data the Strava

organization collects from their users is available for download from a portal that is accessible by partner local authorities who have signed up to the scheme, such as TfGM. TRL have been given access to the data in order to visualize it on the UTC map, and to provide deeper analysis to determine how and where to optimize the road experience for non-motorized users, thereby providing a key resource for a traffic management team. By integrating Strava's data on popular walking and running routes within UTC, LAs can optimise traffic signals to prioritise pedestrian crossings, reducing wait times and improving safety. Furthermore, this integration can also provide valuable insights into pedestrian behaviour and traffic flow. By analysing Strava's data, cities can identify popular pedestrian routes and areas with high foot traffic, allowing them to make more informed decisions about infrastructure improvements and traffic management. Overall, this integration presents a unique opportunity for cities to enhance their pedestrian infrastructure, improve safety, and provide a better experience for walkers, runners, and cyclists.

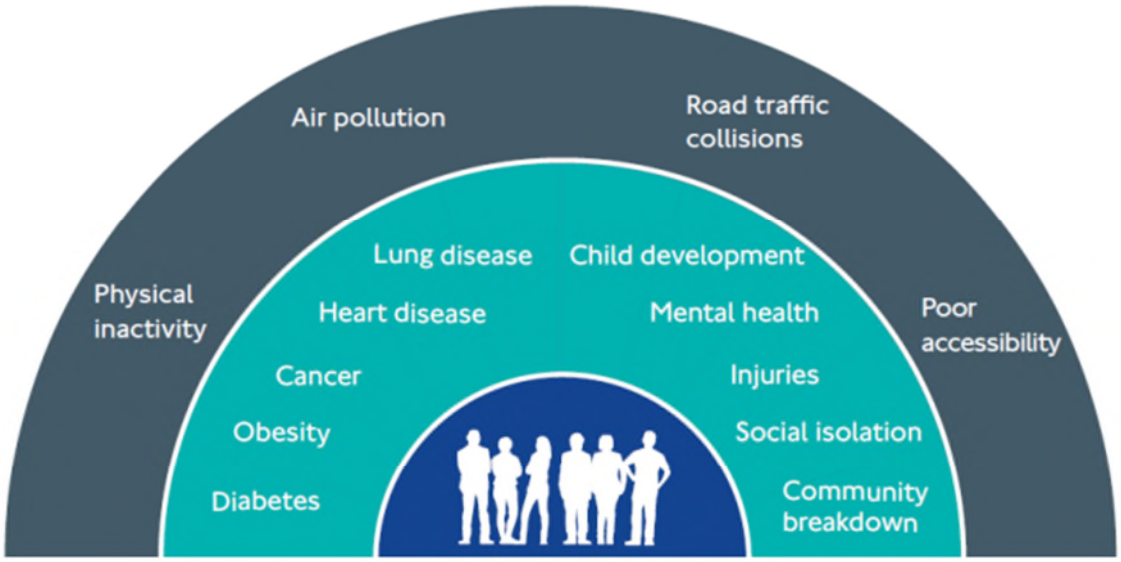
The proliferation of new and emerging trends powered by Artificial Intelligence and other cutting-edge technologies, provide a range of new solutions to the problem of road user management. Coupling the extensive data generated by existing CCTV cameras[i], which are already highly prevalent in our towns and cities, with state-of-the-art AI data processing, cleansing, deep-learning analysis, and segmentation solutions, can provide both historic and near real-time information on the nature of urban activity, allowing for the potential of immediate responses, or long-term strategic planning.

Active Travel and Public Transport

Encouraging modal-shift is a battle on two fronts. On the one hand there is the psychological battle for the hearts and minds of the habitual car user. This entrenched behaviour is perhaps best illustrated by a strident article in support of the private car shown on a California car dealership's website that declares *"The Pros Of Private Transportation: Why Cars Are Better Than Public Transport"*, where they list the following benefits of car usage: convenience, efficiency, comfort, privacy, space, safety and protection from germs – perhaps we would expect this standpoint from a car dealership but the points it raises are very real. Studies have shown that even where there are factual reasons to switch to other means of transport, such as potential for reduced journey time, reduced cost, improved health, environmental benefits, etc, getting people out of cars is often not a rational argument.[ii] For many 'car is still king'.

The other front on which local authorities are battling is really the flipside of the 'car is king' coin – how to make active travel and public transport modes more attractive and a preferred mode of travel to potential users and embed that view in the populace, whilst making car usage a less attractive proposition. In some ways addressing each of the points that our car dealership article helpfully summarizes, is the key. What tactics and approaches can be used to make active and public transport journeys more convenient and efficient? How can we ensure travellers feel safe and comfortable?

Key adverse links between motorized road transport and health



Source: Mayor of London & Transport for London 'Valuing the health benefits of transport schemes' Transport for London 2015 (p5).

Whilst the need for policies that actively discourage the fossil fuel-powered car user are a crucial component of a co-ordinated strategy, the alternative to cars requires positive promotion to make it a viable and attractive option.[iii] There are often specific concerns to address. For bus users, the location and distance between bus stops is a key factor – too few bus stops and the walking distance and time to get to the bus stop increases, too many and the bus will need to stop too frequently, thereby increasing the on-board journey time. Journeys involving transfers from one vehicle to another constitute a risk for travellers, increasing their overall journey time and raising the concern that they may miss their connection and be late. All of which uses up what has been termed the travellers "time budget". Efficient and well-designed public transport routes are critical. Through Bee Network delivery and City Regions Sustainable Transport Settlement, TfGM have a programme of works assessing Quality Bus Transit, assessing bus stops, routes, efficiency, and design. Allied to this is the need to ensure that the urban environment is appealing to walkers and cyclists. Amongst the factors to consider are whether the most-used routes are well-lit, safe, designed for walkers/cyclists not car users, have shelters from weather at bus stops, attractive to all ages and accessibility needs, segregate walkers from cyclists at appropriate locations, and so on.

Consideration of the needs of active travellers and public transport passengers also extends to the design, frequency, and overall behaviour of crossing-points on busy roads, including the optimization and usability of signalized crossings at complex junctions. This is particularly key for older or less mobile pedestrians who express concerns around long-crossing distances or that the green man time is too short. A University College London project back in 2012 established that the majority of people over 65 have a walking speed well below the 1.2 metres per second needed to use a pedestrian crossing – a calculation that has been in use for decades. The DfT guidance published in 2019 recommends that a slower walking speed of 1 metre per second could be applied in areas where there are likely to be a larger number of slower pedestrians or just a larger number of people crossing the road.[iv] Nevertheless, there

remains a general perception that cars are more important, or that drivers will be impatient if pedestrians take too long to cross. This is where intelligent prioritization of buses and non-motorised road users at junctions help to encourage the take-up of active travel and multi-modal transport, by ensuring that the buses run on time, and active travellers experience a safe and enjoyable journey.

Active travel and public transport are symbiotic, the adoption of one increases the uptake of the other. A significant proportion of active travel journeys are made at the start and end of multi-modal trips, where the traveller is accessing and egressing from public transport, often including transfers midway through their public transport journey. Whilst a positive experience on each of the individual sections of a multi-modal journey is important, there is an increasing demand for the entire journey to be considered collectively, and for solutions that make the experience seamless and unified. The market is growing for Mobility as a Service (MaaS) offerings that provide ticketing services and real-time information that help users pay for, plan and be notified about the state of their journeys in an integrated and convenient manner. These platforms are growing in number and offer a real view of what is possible, but there are challenges. The success of MaaS relies heavily on a full and open collaboration between private transport service providers and local authorities, which often requires substantial legal, commercial, and collaborative implementation efforts to deliver. Barriers can occur that often resulting in compromises being made on the end user experience.[v] Whilst these issues are clearly hampering the speed by which MaaS solutions are rolled out, there is an upwards trend towards the usage of these platforms, which heralds a new way of thinking about urban transport to support the ever-growing urban population.

Role of Open Data in Active Travel

The Department for Transport strongly advocates the sharing of transport data in all its forms and purposes, under the 'open by default' data policy. For DfT open data means data that anyone can freely access, use, modify or share for any purpose. Open data should be accessible, discoverable, machine-readable, reusable, and shareable. Ensuring data is open in this manner, allows for greater collaboration across local authorities and their partners, thereby extending the value and benefits of that data beyond the specific scope for which it was initially intended. This is true for all areas of the transport sector and is particularly true for the promotion of active travel.

As local authorities implement more and more technology to support the ever-changing demands placed on their transport departments, the need for open data increases. It is clear that complex problems such as air quality improvements, active travel adoption and road network efficiency cannot be solved with separated and siloed data and software solutions and processes. The need for deep and broad collaboration between systems, departments and individual authorities is key. This really begins with an open data and system model, where the power of combining data from multiple origins and the ability for that data to move freely into and out of connected systems, means that these complex problems can be approached with more innovative solutions. Having consistent and high-quality data also means that the effectiveness of those solutions can be measured, and further improvements applied as necessary. Working in tandem with TfGM, TRL's UTC and SCOOT®7 offering has been developed with this in mind, providing open APIs and access to historic and real-time data feeds, whilst integrating floating vehicle and incident data from Waze for Cities into a single shared view of activity on the street.

Conclusion

Active travel and public transport, implemented in a joined-up manner, are vital components of a safe, healthy, and efficient urban transport network. Traditionally, technology systems adopted by urban transport management departments have been heavily focused on the efficiency of the road network for motorized vehicles. This model has been changing and we will continue to see a realignment of investment and focus on active travel as the demand becomes ever more urgent and necessary. It is clear that all future systems, such as UTC, which deal with transport and traffic management, cannot function on their own and must have key active travel capabilities built into their core architecture and design. Active travel cannot be progressed in silos and single system approaches – collaboration is needed, and open data and systems are key to achieving this outcome. Local authorities are the prime movers in this space and recognize the importance of active travel. They should be procuring solutions and adopting processes that ensure that have active travel at their core and are fully open and interoperable.

Resources

[i] Estimating Vehicle and Pedestrian Activity from Town and City Traffic Cameras by Li Chen, Ian Grimstead, Daniel Bell, Joni Karanka, Laura Dimond, Philip James, Luke Smith and Alistair Edwardes (3rd July 2021 - Sensors Journal)
[ii] Why People Choose Cars, Even When Mass Transit Would Serve Them Better by By Eric Jaffe (February 1, 2013 - Bloomberg)
[iii] How to drive a modal shift from private vehicles to public transport, walking and cycling (August 2021 – C40 Knowledge Hub)
[iv] Traffic Signals Manual Chapter 6 section 18.6.2 (2019 Department for Transport)
[v] Why haven't we made MaaS work? By Beate Kubitz (September 8th 2022 Passenger Transport)