

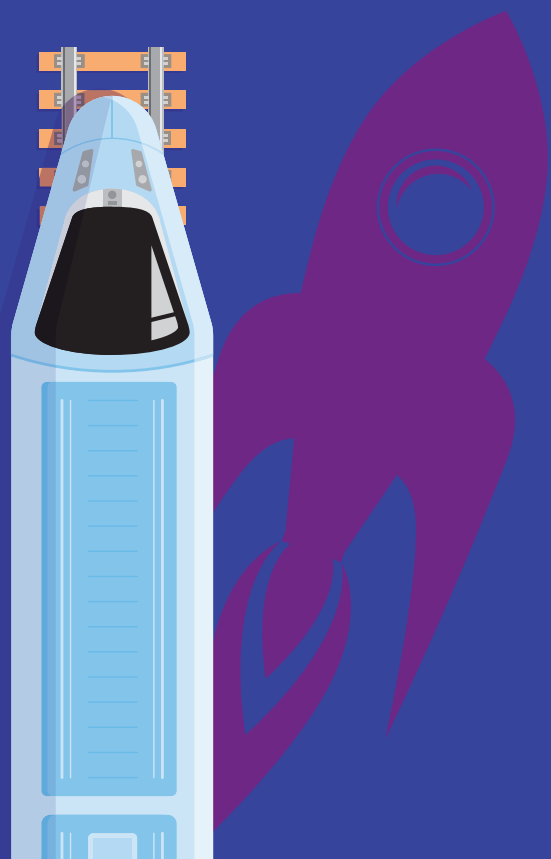


Reimagine public transport bottlenecks

**How data and digital technologies
could reduce congestion and delays
on urban public transport networks**

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Let's reimagine...



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This paper is one of a series of thought experiments in which KPMG staff consider how digital technologies could support faster, simpler, cheaper, more comfortable and more reliable travel.

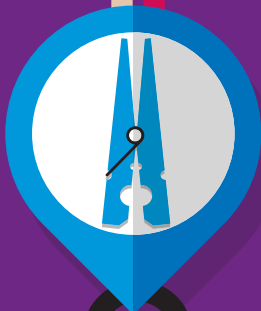
This might mean working up new and disruptive business models. Or finding new ways to take advantage of growing mobile connectivity and data sharing. Or tapping into the power of markets, incentives, analytics or the wisdom of crowds. In every case, it involves fresh ideas.

We have only pursued concepts that could realistically be delivered within a few years, and which offer benefits to travel operators, public authorities and customers alike. But within those constraints we want to step outside conventional thinking, and test out new approaches to realising public, commercial and personal goals. We want to stretch ourselves, applying new technologies and techniques to solve old problems. We are not calling for a specific future – but we are reimagining it.

Much of the transport agenda revolves around building new roads, rail and aviation infrastructure. But making better use of virtual networks could achieve just as much in making UK travel faster, more convenient and more reliable.



Pinch points in our public transport interchanges limit the network's capacity. Ben Foulser suggests a way to relieve the pressure at these crucial bottlenecks, providing faster and more reliable passenger journeys

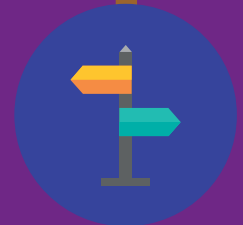


The capacities of major cities' public transport systems are limited by particular bottlenecks, often at interchanges between modes of transport or tube lines. For example, staff at Victoria underground station in London often have to shut the station during busy periods when the flow of passengers arriving from the mainline station grows too great – leading to delays for passengers and creating risks as large crowds build up.

Because other parts of the system have much greater capacity, relieving the pressure on these pinch points increases capacity across the network. And sometimes this pressure can be relieved without the need for expensive and disruptive engineering and construction work – by, for example, encouraging people to walk rather than taking short metro journeys.



Some transport authorities have already recognised the potential of this approach: Transport for London, for example, publishes a metro map listing the time it takes to walk between stations. But such initiatives could have much more impact if people were provided with specific, targeted information that's relevant to their journeys, and incentivised to walk around particular bottlenecks at busy times.





Because most public transport users in major metropolitan cities use some form of smart ticketing solution, transport authorities have good information on their regular journeys; and where passengers have registered, transport managers also have their customers' email addresses. Using both information on historic patterns of network use, and the real-time data available from smart ticketing solutions, CCTV and other non-transport data sets (such as mobile network data, Beacon and WiFi data), transport authorities have the tools to predict when and where passenger numbers might overwhelm capacity. Thanks to smart ticketing, they also know the identities and access points of many of those currently undertaking journeys.



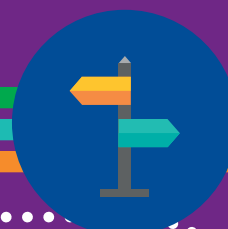
With WiFi available on an increasing number of metro and bus networks and at many mainline stations, it's nowadays possible to get information to travellers during their journeys. So by drawing on their congestion and contacts data, transport authorities could get in touch with individual passengers before they reach points of overcrowding, and suggest that – assuming they're on their regular route – they take a short walk around the pinch point. For example, a customer who regularly gets off at Newcastle's Central Station and takes the Metro to Haymarket might be encouraged to walk from Central Station to their destination – a walk of under 15 minutes.

Alternatively, transport authorities could put individual travellers in the lead – producing an app that aggregates real-time data on passenger flows, highlights points where numbers are rising towards maximum capacity, and offers alternative routes around them. We know that this is technically possible and commercially viable: in 2013, Google paid \$1bn for Waze: an app which uses crowdsourced, location-based, real-time data to inform users about accidents, bottlenecks, and traffic on the road network.

Whether transport authorities use direct digital communications or an app, the ability to contact travellers during their journeys would be particularly valuable when incidents, strikes or equipment failures lead to localised congestion: messaging people heading for the problem, authorities could help release the pressure and prevent a single incident from creating knock-on effects across the network.



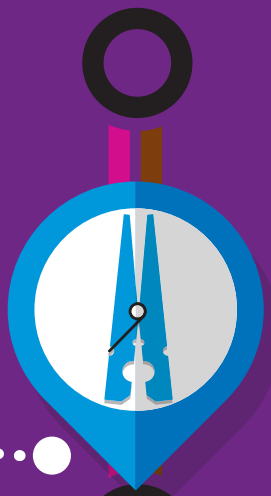
Many passengers underestimate the length of time it takes them to change trains or transport modes, particularly where tube connections involve long walks between platforms – such as when switching between the Victoria and Piccadilly lines at London's Green Park, or moving between the connected Bank and Monument stations. So the system could calculate the net change in journey time involved in taking the suggested alternative route: where the traveller's onward journey is only a couple of stops, walking might take only a couple of minutes longer than public transport. Potentially, disabled people could also benefit from such a system – particularly where connections entail lots of stairs, and in areas where the pavements are wide and easily navigated.



To incentivise people to walk around bottlenecks, transport authorities could provide rewards for taking the pressure off public transport – providing discounted journeys, or entering into partnerships with relevant businesses. Companies selling goods as varied as folding bicycles, footwear, coffees, sunglasses and music might be willing to join a points scheme where, over time, passengers who regularly take suggested alternative routes earn price discounts. Or transport authorities could set up a prize draw, with one or more active participants selected at random to win prizes each week. The size of incentives could reflect the need to cut passenger numbers at a particular bottleneck – growing at particularly busy times, at the tightest pinch points, and when real-time data on passenger numbers or delayed services predicts a crush.

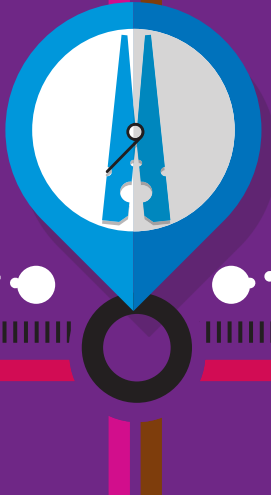


To make walking journeys easier and more interesting for passengers, apps and websites could show people's route and location on a map, and provide detailed directions; they could even point out interesting sights and local history along the route – a facility that could also provide commercial opportunities through partnerships with local retailers. If travellers would rather cycle to their final destination, the app could point them to the nearest cycle hire location, tell them how many bikes are available, and switch to a hands-free navigation system using spoken instructions. Mobile devices' GPS systems would also be used to verify that passengers have indeed followed the suggested alternative route, and to alert them if they appear to be going the wrong way.



Sometimes, people may be reluctant to walk instead of taking public transport – particularly when they don't know the area, when the weather's bad, or when they have health conditions. So a variation of the scheme could instead encourage people to follow a route that involves changing buses or trains at a less crowded interchange – giving them incentives and a better travel experience in exchange for a slightly longer journey.

These systems would fit well within the apps currently being operated and developed by transport authorities, and could be provided in two stages: a simple set of suggestions that help people avoid overcrowding in order to have a more pleasant journey; and the offer of incentives when congestion threatens to cause delays on the network.



Every day millions of passengers take relatively short rides on different modes of transport during their travels around the UK's major cities, often without realising how easily and quickly they could walk some of those stretches instead. By combining real-time and historical data, communications technologies and incentives systems, transport managers could produce benefits on all sides – increasing the network's capacity, improving the travel experience, reducing the impact of accidents and delays, and cutting risk and overcrowding at bottlenecks.

The big winners, though, would be those travellers who decide to walk around constricted or lengthy connections. Not everyone would be willing to stretch their legs or give their journey a few extra minutes, of course. But those who did participate would receive rewards for reducing pressure on the network; benefit from more exercise; enjoy guided walks through their city; and, above all, avoid that horrible daily crush as a thousand irritated commuters funnel through a transport pinch point.

Our public transport systems do an incredible job, moving millions of people every day. But they'd do even better if some of those travellers stepped aside at key points, helping to create a system that works better for everyone – themselves included.

Author biography

To discuss this piece in more detail feel free to contact the author.



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Ben is an Associate Director in our Transport Advisory Practice and helps lead a team providing consultancy services to clients with respect to integrated and intelligent transport including smart ticketing/fare payment systems, asset management information systems (including Building Information Modelling (BIM) & whole life costing) and Command & Control solutions (including network capacity modelling and management). We advise clients across the technology life-cycle, from development of technology strategy and operating models through to requirements definition, sourcing, project management and operational assurance.

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