CUSP London Data Dive 2021

Future Mobility in Cities

With Transport for London, Reed Mobility, WSP, Ginger, RunFriendly, GHD and Chordant,

15-19th March 2021 - Teams Platform

Programme

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Context

An introduction to London

London is a growing and diverse global city, the capital of the United Kingdom (UK), and home to many national institutions, government buildings and company headquarters. To illustrate, in 2017, the city topped the Global Power City Index (Institute for Urban Strategies, 2017) and was second only to New York in A.T Kearney's Global Cities report (Hales, Mendoza Peña, Peterson & Dessibourg, 2018).

At present, the city has a population of 8.9 million Londoners spread across 32 geographic boundaries known as boroughs. These are further split into over 600 geographic areas known as 'wards'. According to United Kingdom's Office for National Statistics (ONS) this population has increased by over half a million people over the last six years. This number further swells by **approximately one million additional individuals daily**; a routine flow of visitors, tourists and commuters.

The CUSP London Data Dive is an annual event at which teams of student participants tackle an interesting city data analytics challenge across a week. This year, the topic is **the future of urban mobility**. Within this broad theme, we will focus on the future of rail travel, micro-mobility, and active travel within London, but connecting to international cities, such as New York, for comparison, and to urban areas of different scales within the UK. The event is a collaboration, based at King's College London, involving several other universities, public sector and private sector contributors.

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There are many potential directions that urban mobility may take in the future. For example, electric scooters (e-scooters) are becoming more common in British cities, especially as an option for short journeys. They are, however, still illegal on the road in the UK, as they fall into the classification of "motor vehicles" and as such require the drivers to have insurance, driving licences, number plates, helmets etc. In many countries they do not fall into this category, so use is allowed on the roads and rental schemes operate without direct government regulation.

In March 2020, the Department for Transport started a consultation for its "future of Transport Regulatory Review" to explore the idea that e-scooters could be used on the roads and assessing accessibility and social inclusion, rental schemes, trials, insurance issues etc. E-scooters are promoted as a low carbon form of transport that could improve local air quality, reducing pollution and congestion. The following provides some for some relevant policy context around micro-mobility:
https://publications.parliament.uk/pa/cm5801/cmselect/cmtrans/255/25502.htm
There is also growing consumer demand for fast and efficient delivery services. Delivery services have to contend with increasing traffic congestion and government restrictions or penalties in cities for using traditional vehicles. Therefore, potential environmental and financial benefits of switching from traditional van-based deliveries to an alternative operating model, where porters or cycle couriers undertake deliveries are being scrutinised. The following analyses the potential benefits of micro-mobility for deliveries:
https://westminsterresearch.westminster.ac.uk/item/qyq9v/quantifying-environmental-and-financial-benefits-of-using-porters-and-cycle-couriers-for-last-mile-parcel-delivery

Any current analysis of course needs to account for the effects of the pandemic and potential long-term change in travel practices. There has been a huge reduction in journeys made through all methods, estimated from app usage and journeys tracked, whilst Londoners were in the Covid19 era. When restrictions were eased over the summer, there was a gentle recovery until October this year, as new measures restricting movement were introduced. As shown by data from Citymapper, Apple and Google data both indicate another drop in transit station traffic since measures have been re-introduced. The following report analyses the effect of Covid-19 on London travel:
https://data.london.gov.uk/dataset/coronavirus-covid-19-mobility-report

The myriad of economic impacts arising from the COVID-19 will unfold in time, and how will this crisis be spread across the country? Looking at jobs predicted to be the most and least affected in the short- to medium-term and which places are expected to bounce back more quickly could help predict and redirect this impact. The following report analysis the effects on UK high street footfall and spending from the start of Covd-19:
https://www.centreforcities.org/data/high-streets-recovery-tracker/
Looking more broadly, the following active travel reports for London and UK Department for Transport give a sense of ambition and direction of travel (pun intended):
https://www.gov.uk/government/publications/cycling-and-walking-plan-for-england
https://tfl.gov.uk/corporate/about-tfl/how-we-work/planning-for-the-future/encouraging-cycling-and-walking#:~:text=The%20overarching%20goal%20of%20the,the%20London-wide%20cycle%20network.

Our partners in this event provide data and/or guidance to make the event interesting and help increase the impact of its results:

Reed Mobility
Reed Mobility is an independent research consultancy founded by former TRL Academy Director and head of mobility R&D at Bosch, Prof. Nick Reed. We work with partners in the public, private and academic sectors to deliver transport systems that are safer, cleaner, more efficient, more ethical and more equitable. Based on experience working on urban mobility challenges with cities worldwide, Reed Mobility has contributed to the CUSP London Data Dive 2021 by helping to define the questions for participants to address over the course of the event.

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Transport for London (TfL) - Public Transport Service Planning

TfL is an integrated transport authority responsible for meeting the Mayor of London's strategy and commitments on transport in city. We run the day-to-day operation of the Capital's public transport network and manage London's main roads. Our Department – Public Transport Service Planning: TfL PTSP plan the transport development of TfL Rail, DLR, Trams, Buses, London Overground and London Underground to meet the changing needs of our customers. We support our colleagues across TfL to ensure the best decisions are made to develop and enhance the TfL network.

Chordant

Chordant provides SaaS data sharing solutions that enable our customers to realise value from data. Our solutions power data-driven applications for Cities & Regions, Connected & Autonomous Mobility and Complex Infrastructure & Facilities. Chordant has been recognised by numerous analyst firms and organisations for its industry-leading solutions. Convex, operated by Chordant, enables new mobility solutions by sharing, transforming and integrating dynamic mobility data between organisations and systems.

WSP - Future Mobility

WSP is one of the world's leading professional engineering services firms, providing technical expertise and strategic advice to clients across a range of sectors in the built environment. WSP's Future Mobility team adopt a people- and place-centric approach to planning transport and mobility from micromobility trials for the UK's towns, planning car-free lifestyles for garden villages to planning autonomous shuttles to serve the mobility impaired. Toby Thornton, Technical Director within the Future Mobility team (and Research Associate at CUSP London) has a key focus on understanding the viable business models that are both feasible and desirable for end users.

GHD - Movement Strategies

Movement Strategies (a GHD company) has been working in the field of people movement since 2005. It works across a range of sectors (transport, events, cultural/civic, healthcare, education, urban spaces) examining routine, safety and security scenarios. It specialises in data collection, pedestrian/evacuation modelling and data analytics. Its team of 20+ consultants represent a broad area of expertise including engineers, mathematicians, social scientists, computer/data scientists. It has been involved in numerous high-profile projects including Olympics 2012, 2014 Sochi Winter Olympics, O2 Arena, Canary Wharf, Glasgow 2014 Commonwealth Games, Tottenham Hotspur (new stadium), Wembley Stadium Masterplan, Euston / Bank Monument Stations, Tower of London, Newcastle University, Manchester Airport Interchange, Glastonbury Festival, Reading Festival and Wimbledon LTA Master Plan.

RunFriendly

RunFriendly build digital tools to make it friendlier to ride bikes, run and do active things outdoors. As seen in Men's Health as a 'Top App to Change Your Life in 2020' and as an 'Eco Hero' by Runner's World. Our customers include Nike and HSBC. RunFriendly is a solution from Active Things. We are building the digital infrastructure & network to make it friendlier to ride bikes, run & walk in cities. Right now, we're trying to help us do Active Things during the coronavirus. This includes a volunteer service whereby we help runners (and bike riders) 'run-an-errand' for those most at-risk of COVID-19.

Ginger

Ginger are an easy to use service, fitting in and improving the street scene, not blighting it, working together on future road design, building sustainable revenue share, sharing data, learning together. Integration with public transport and helping with related priorities:

- Promoting and preserving our high streets and community centres

- Real solutions to manage growth - active partnership with new major developments
- Improving and promoting better air quality and improved quality of life
- Working with community groups and building community cohesion

We believe that successful shared transport services deliver benefit to all residents, not just direct users. Ginger has live e-scooter fleets in Middlesbrough, Hartlepool, Chester, Stafford, Scunthorpe, Milton Keynes, and Whitehaven, Stafford, with more to come soon.

Starting point questions

Each team in the Data Dive will be assigned a different question to answer. This is a starting point from which to creatively explore and does not constrain you to stick rigidly to this question if the data you find and the expertise you have in your team means different angles appear promising.

1. What is the potential for micro-mobility and e-bikes to transform urban mobility in UK cities? Can we use transportation data from the UK and beyond and in combination with other relevant datasets (e.g. air quality, weather etc.) to predict the number and types of trips (passenger journeys and goods deliveries) that can / will be taken using new modes such as e-scooters, e-bikes and e-cargo bikes? This could include effects on accessibility, traffic and air quality and should also consider whether trips currently made by walking, cycling or public transport would be replaced by these new modes and any anticipated seasonal variation in their use. You may also consider how these new modes might connect to existing transport hubs to enable greater use of public transport services or support urban freight consolidation centres.

2. How has Covid-19 impacted rail demand across London and on the routes into London, and how might demand evolve in future? Lockdowns have led to only 'essential' trips being made: where can such essential trips be found? How and where has mass working from home changed travel demand? Think about what this might tell us about a future with greater numbers of people working more flexibly. How do rail trips differ across London? Do some Londoners face more complicated trips than others? What has been the impact on commuter corridors into London? How has it impacted our hubs and peak demand? What is likely to be the long term change and demand for routes into and across London?

3. Will future commuter travel in London be more or less active? Has there been a shift (proportionally and to what scale / impact) to more or less active travel (cycling and walking) for London commuters in recent years? Do the changes in commuter travel seen during 2020 indicate such trends might change in future? What might be the cause, e.g. infrastructure changes, of shifts onto or away from active travel for residents of different areas of London? Is there a shift of usage between rail travel and active modes? What impact does weather have on shift to resilient active travel modes and micro-mobility? Can we determine between long term adoption and short term use of active travel and what are the variations between and in these groups?

4. What transport-related initiatives have international cities taken to make themselves ready for the future of urban mobility, and how do we compare between them? In particular, you could consider London and New York in the comparison**.** How and where may these initiatives readily translate to London? Consider demographics, existing transport infrastructure, and government structure. How significant is micro-mobility, data availability or political will might differentiate between cities in their future transport plans. What are the likely predominate changes for urban mobility?

5. How has cycling-relevant street infrastructure changed in London and what might this suggest for future support for cycling in the city in future? Can we create a map that incorporates all relevant cycling infrastructure at present? What is the potential for adding a network of secure bike (and e-bike) parking in London that can be accessed on-demand? You may want to identify and map potential popular

locations in London where cyclists, based on origin/destination and other data (e.g. retail and leisure spend, footfall, cycling count, Strava etc) may want to stop and secure their bike for 30 mins to 3 hours. With cycle theft increasing year-on-year, there is a case for more secure urban parking for bikes. This is distinct to storage at home or in primary places of work (typically more than 3 hours) but instead intermediate journeys that cyclists would like to make on their bikes – e.g. stopping to meet friends for food or a drink, calling in at the gym, stopping to pick up some shopping etc. Research by CUSP London partner Active Things indicates that risk of theft puts off many cyclists making these intermediate journeys and has a negative impact on cycle use (i.e. they don't use the electric bike if they plan to go to meet friends after work). Where should the first 100, 500 and 1000 lockers be installed to best cater to these intermediate journeys? What kind of profile of use could be imagined in terms of daily usage patterns? Do the current deployment on street and secure bike racks match the need for secure parking?

6. What are the best ways to improve air quality in London through transport changes? What are realistic and practical solutions to tackle the problem? Consider alternative policies, e.g. is it better to take X number of any cars off road, better to add X number of only electric vehicles, or hybrid cars going forward or better to take X number of the worst polluting cars off the road? How about the influences from exhaust and non-exhaust (tyres, brakes etc.) pollutants? What is the ratio and impact on air quality between quantity of cars versus idling vehicles? Consider comparison with other cities such as New York.

7. How has London driving behaviour changed from the past to post-Covid? What is an accurate average distance per journey (origin to destination) when driving through London? This should be a more accurate picture of road usage in the city of all vehicles on the road, rather than just road usage of London residents. How can this inform the decisions we make to tackle congestion and the adoption of alternative modes of transport? What will be the predicted peak hours for demand in the post-COVID travel environment? Will it be a flatten and lengthening of the curve or will we see spikes at different times? Is the rise of active travel and micro-mobility having an impact on car usage?

8. How is micro-mobility usage changing over time and in different UK towns? How are e-scooter journey patterns evolving over time, and can we derive how many journeys are being used for regular transport vs recreational use? How do different pricing models impact usage? How much of a difference does new cycle infrastructure impact on e-scooter use, e.g. new/temporary cycle lanes introduced during the Covid pandemic? How should e-scooters be distributed among parking bays to maximise utility or revenue, and where and how many should such parking bays be?

9. How has New York driving behaviour changed from the past to post-Covid? What is an accurate average distance per journey (origin to destination) when driving from/to or through New York City? This should be a more accurate picture of road usage in the city of all vehicles on the road, rather than just road usage of New York residents. How can this inform the decisions we make to tackle congestion and the adoption of alternative modes of transport? What will be the predicted peak hours for demand in the post-COVID travel environment? Will it flatten and lengthen the curve or will we see spikes at different times? Is the rise of active travel and micro-mobility having an impact on car usage?

10. How has micro mobility-relevant street infrastructure changed in New York City and what might this suggest for future support for micro mobility in the city? Can we create a map that incorporates all relevant micro mobility (i.e., cycling, e-bike and e-scooter) infrastructure at present? What is the potentiality for city renovation projects to add networks for micro mobility capacity? You may want to identify and map potential popular locations in New York City where cyclists for example, based on street space, origin/destination and other data (e.g. retail and leisure spend, footfall, and cycling count etc.) could utilise for a secure stop of their bikes? What kinds of infrastructure could be considered? For example, where should the potential lockers, if any, be installed to best cater to varied journeys? What kind of profile of use could be imagined in terms of daily usage patterns? Does the current deployment on street match the need for security and safety?

Data

Datasets dependably available to teams in the Data Dive are accessible from the Data Dive Github, including a Microsoft Word file “Open Data Source.docx” listing out the links for suggested data, e.g. (but not limited):

- NUMBAT rail travel database from TfL (London)
- Google mobility data from London Datastore (London)
- Various socio-economic data from London Datastore (London)
- London's Cycling Infrastructure Data - Cycling.data.tfl.gov.uk (London)
- Ordnance Survey data (London)
- Open Data (New York City)
- BUILT @NYU (New York City)
- Department of Transportation (New York City)
- etc.

Several vector datasets for London area had been provided for direct use from the Data Dive Github, including:

- Streetspace Geopackage data (London)
- London LSOA boundary shapefile & Deprivation Index data 2019 (IMD 2019)
- Point of Interest data collected from Digimap (London)
- Open roads data collected from Digimap (London)
- etc.

Ginger will be providing a subset of their journey data for the following fleets: Middlesbrough, Hartlepool, Milton Keynes, Stafford, Scunthorpe and Chester. The data will span from each individual fleets' launch date through until the end of February. We are also expecting some more team-specific data will be available in due course, and the event organiser will communicate assigned teams directly for accessing this data.

In addition, participants are encouraged to explore other complementary opensource data useful to answer the question assigned to your team.

Data Dive Practice

Towards the end of the event, each team will prepare a video on the methods they have applied and the insights they have found. The team videos will be shown in the closing session, with chance for Q&A. Please upload your team presentation video (10 minutes max.) onto Data Dive 2021 Videos by 12pm GMT time on 18th March 2021.

We would like to ensure the work of the Data Dive teams can persist to have impact into the future. As such, please upload your final source code by team onto CUSP London Data Dive 2021 Github at the end of the Data Dive. Please do not include any non-public data.

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2021 CHALLENGE PROGRAMME STRUCTURE

Theme	Date & Time	Activity	Platform
Launching session & Team build-up	**Monday 15th March** 10am-12pm GMT	• Talks from CUSP London, TfL, Reed Mobility, RunFriendly, WSP, Chordant • Introducing teams and facilitators • Warm-ups • Meet teammates and contact each other on Slack	Teams (recorded) Join HERE
4-day Hackathon	**Monday 15th March**	• Team Brainstorming, and individual assignments allocated within each team. • Research hypothesis proposing, context research, data exploration. • Daily team catch up – consultation with Mentor if needed. • **Mentoring Time (2pm-3pm GMT)** with: Bowen Zhang, Jasper Snel, Zahra Mahabadi and Robert Greener	Slack Join HERE
	Tuesday 16th March	• Devise methodology; preliminary analyses, expectations set up • Team daily online catchup, consult Mentor if needed • **Mentoring Time (10am-11am GMT)** with: Bowen Zhang and Robert Greener • **Mentoring Time (2pm-3pm GMT)** with: Bowen Zhang, Jasper Snel, Zahra Mahabadi and Robert Greener	Slack Join HERE
	Wednesday 17th March	• Discussion of preliminary outputs, improvements and further analyses. • Conclusions, hypothesis testing etc • Team daily catch up online and consultation with Mentor if needed. • **Mentoring Time (10am-11am GMT)** with: Bowen Zhang, Robert Greener and Patsy Wong • **Mentoring Time (2pm-3pm GMT)** with: Bowen Zhang, Jasper Snel, Zahra Mahabadi and Robert Greener	Slack Join HERE
	Thursday 18th March	• Policy recommendation • Presentation production • **Mentoring Time (10am-11am GMT)** with: Bowen Zhang, Robert Greener and Patsy Wong • **Mentoring Time (2pm-3pm GMT)** with:	Slack Join HERE

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		Jasper Snel, Zahra Mahabadi and Robert Greener • Video Submission: **Outputs should be uploaded onto Github in format of video presentation (10 minutes max.) by 12pm GMT on 18th March**	
Judges review presentations	**Thursday 18th March**	Members of the Judging panel will mark each video presentation	Video media Contact Organiser
Closing Session	**Friday 19th March 12pm-2pm GMT**	Final video presentation broadcasting, Q & A, final winner team announcement	Teams Join HERE

The Judging Panel:

There will be 2 prizes awarded: Overall Winners and Best Technical

The Judges will consist of:

King's College London	Dr Simon Miles – CUSP London Director
King's College London	Prof Mark Kleinman
University of Warwick	Prof Joao Porto De Albuquerque
Transport for London	Mr Thomas Stone / Mr Howard Wong
University College London	Dr Adam Dennett

General Information

We are looking forward to greeting students, researchers and academics from King's College London, New York University, University of Warwick, University College London, University of Leeds, and University of Glasgow. We hope that the data challenge will be an enjoyable and productive week.

We will be using the Github (private), Slack and Microsoft Teams platforms to enable working together in privacy. We will have specific "coaching" times each day where Academics and Teaching Assistants join groups to assist with your questions.