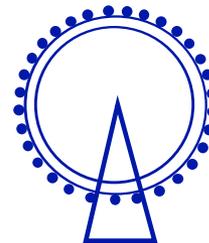




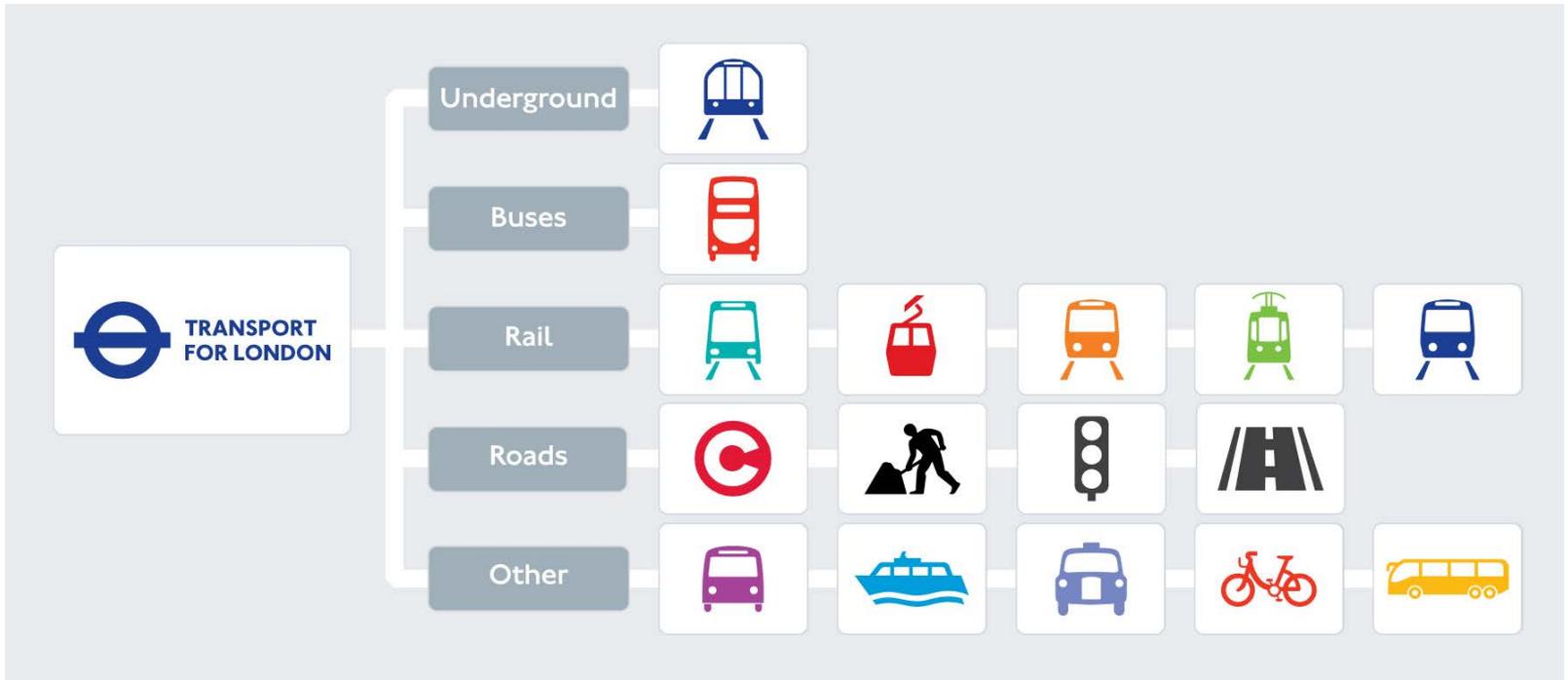
Delivering Better Transport with Data

Lauren Sager Weinstein
Chief Data Officer, Technology & Data
Transport for London



EVERY JOURNEY MATTERS

Our responsibilities





Our Purpose

- To deliver for the Mayor
- Keep London working and growing and make life better
- Every Journey Matters



Our priorities:

Customer

To put customers and users at the core of all of our decision making

Reliability & Safety

To drive improvement in reliability and safety across our network

Capacity & Growth

To accelerate the growth and increase the capacity of our network

Our people

To invest in our people and lead them to be the best they can be every day

Finance

To cost less and generate more income

Technology & Data

To exploit technology to produce better and faster results



Delivering for the future: Mayor's Transport Strategy

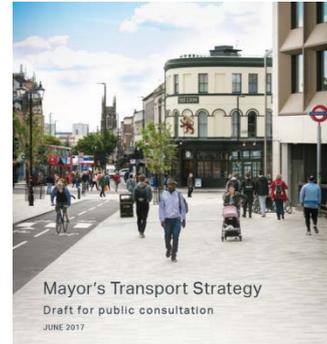


Healthy streets and Healthy People



A good public transport experience

Our data work must help deliver this



Planning for new homes and jobs



We are data rich



19 million
smartcard ticketing
transactions a day
from **12 million**
active cards

12 million ANPR
registration plates
from the **1600**
cameras across our
road network



4.5 million ibus geo-
located events



650,000
tfl.gov.uk
website
visits

15,000 SCOOT
detectors creating
5.2bn records



500,000 rows of
train diagnostic
data on the
Central Line alone



250,000 daily train location and
event data from NETMIS



DATA ITSELF IS NOT ENOUGH

We must make it useful

- Transforming data into intelligence to drive improvement



- Putting our customers at the heart of what we do
- Improving our operations & safety
- Supporting new capacity & growth



Personal Data and our big data approach

- Protecting the privacy of our customers is paramount
- We have a transparent and layered approach to privacy
 - Present information at point of collection
 - Direct people to www.tfl.gov.uk/privacy for more info
- New data initiatives involving personal data undergo a Data Privacy Impact Assessment
- Our Analytics team work very closely with our Privacy and Data Protection team
- We have regular engagement with the ICO and rely on their guidance
- When we work with our Academic Partners we use **Non-Disclosure Agreements** to safeguard data



Advising customers on travel options

Highbury & Islington station

New or occasional customer at this station?

The busiest time here is between 08:15 and 08:30

Number of customers travelling on the Victoria line southbound

TfL is investing to improve the capacity and frequency of Tube services but we know that at certain times and places the network can be very busy.

If you are able to travel outside this time you could have a more comfortable journey.

MAYOR OF LONDON

TRANSPORT FOR LONDON
EVERY JOURNEY MATTERS

London Underground

New or occasional customer at Mile End?

If you don't use this station often, you may like to know that the busiest time here is between 08:15 and 08:45.

Number of customers travelling on the Central line northbound

If you are able to travel outside this time you could have a more comfortable journey.

MAYOR OF LONDON

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Know your travel options

The Central line at this station can become busy at peak times. You may benefit from a quicker journey into central London if you take the first District or Hammersmith & City line train.

Mile End Monument Bank
District 10 minutes →

Mile End Liverpool Street
Hammersmith & City 9 minutes →

More than a billion journeys are made on the Tube each year, with almost one million journeys made on the Central line each day and the number is increasing as London continues to grow.

We are investing to improve the capacity and frequency of your Tube services but we know that at certain times and places the network can be very busy. We are providing information on the busiest time at Mile End station as we know that over 50% of customers do not regularly travel from here. The busiest time at this station is between 08:15 and 08:45. If you are able to travel outside this time you could have a more comfortable journey.

To find out how TfL are reinvesting in transport, visit: tfl.gov.uk/campaign/reinvesting-in-transport

recycle Printed on recycled paper

tfl.gov.uk
24 hour travel information
0343 222 1234*
Sign up for email updates
tfl.gov.uk/emailupdates
@TfLTravelAlerts

*Service and network charges may apply. See tfl.gov.uk/terms for details.

Baham station

New or occasional customer?

This station is particularly busy between 0800 and 0830 on weekdays.

Number of customers

If you are able to travel outside of these times, you could have a more comfortable journey.

MAYOR OF LONDON

Travel options from Baham station

New or occasional customer at this station?

The busiest time here is 08:00 - 08:30 on weekdays

If you are able to travel outside of this time, your journey could be quicker and more comfortable.

Customers

Journey time to Moorgate

Time (am)	Journey time (min)
07:00-07:30	29
07:30-08:00	29
08:00-08:30	36
08:30-09:00	31
09:00-09:30	28
09:30-10:00	27

complete 90% of journeys

i Travel updates
Be in the know about how your service is running with our real-time updates.
[View our real-time updates](#)

By foot
[View walking times between stations](#)

By rail
[View Tube and rail map](#)

TRANSPORT FOR LONDON
EVERY JOURNEY MATTERS

Station closures

London Fields
Cambridge Heath
Bethnal Green
Bow Road
Bow Church
Devons Road
Langdon Pa

Shoreditch High Street
Stepney Green
Whitechapel
Aldgate East

Disruptions highlighted

Station Information

Tottenham Court Road Closures +
Tufnell Park Closures +
Acton Town Information +
Aldgate Information +
Archway Information +
Baker Street Information +
Baham Information +
Bayswater Information +
Bethnal Green Information -

Bethnal Green: The busiest time at Bethnal Green station is 08:15 - 08:45. If you're able to travel outside of this time you could have a quicker and more comfortable journey.

Register your journey

Close status

Bow Road Information +
Canon Town Information +
Canary Wharf Information +
Colliers Wood Information +
Croydon Station Information +

Follow us on Twitter
Combined service information for the Tube, DLR, London Underground, trams and Emirates Air Line
Follow @TfLTravelAlerts

Email updates
Customer updates and advanced warning of weekend closures and planned works
Register



Putting things right when they go wrong

Major disruption

Your train service yesterday morning
I am sorry for the disruption to Metropolitan, Hammersmith & City and Circle line journeys.

Lines	Stations	Add favourites
London Overground	Part closure	+
TfL Rail	Part closure	+
Bakerloo	Good service	
Central		
Circle		
District		

GET MONEY BACK FOR DELAYED JOURNEYS

Our Action



Operational Research team undertake analysis and pattern matching to identify customers

Customer Benefit



We automatically refund our customers – no need to apply

TfL Benefit



Fewer calls to Contact Centre



Understanding Customer patterns

Commuters

- Travel often (~4 days/wk)
- Regular Schedule
- First journey in AM peak
- Clear working days
- Most journeys to and from same locations

Irregular Frequent Users

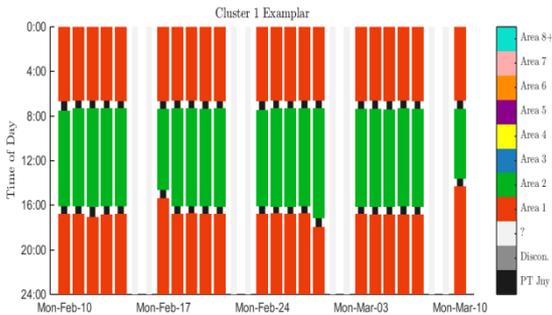
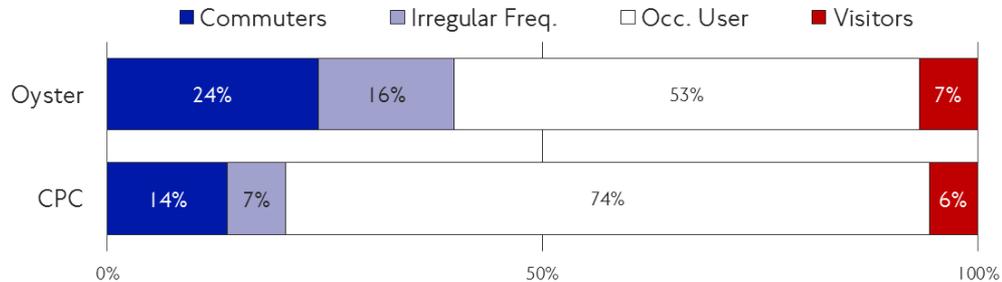
- Travel often (~4 days/wk)
- Irregular schedule with variable first journey time
- Some working days
- Visit more locations than commuters

Occasional Users

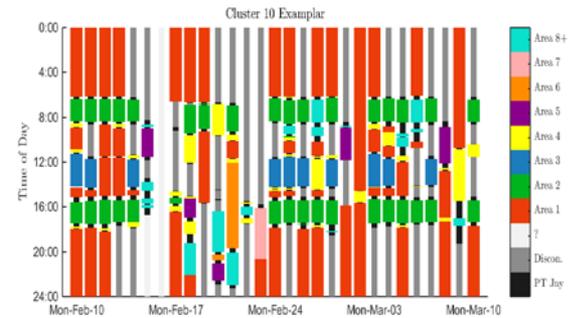
- Travel occasionally (~1 day/wk)
- Start travelling later in the day
- No working days
- Visit various locations from journey to journey

Visitors

- Travel for limited period (~2.5 days)
- Start travelling late morning
- No working days
- Visit multiple visitor locations



- Helps to understand response to our messages
- Guides placement of signs at stations

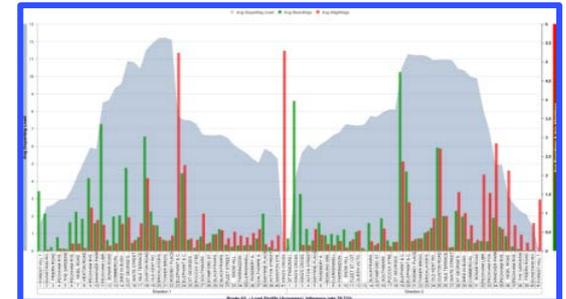




Origin Destination Interchange Tool (ODX)

Capacity Planning

Business Intelligence



Pattern recognition and business logic

Bus boarding
entry taps



Other modal
taps



Bus location
data

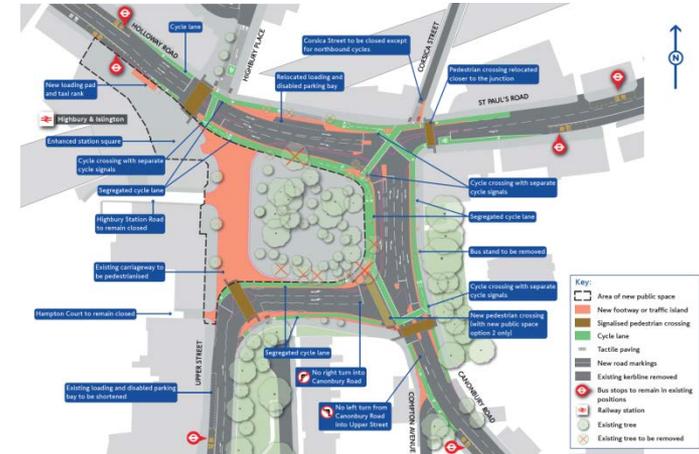


Matrix to infer our public transport journeys



ODX to Improve our Network

- Roads Modernisation Programme
 - making London's busiest junctions safer and more attractive for vulnerable road users
- ODX used to understand customers' interchange movements
 - Highbury and Islington
 - Archway
 - Old Street
 - To identify whether and where to relocate bus stops



Exploring new opportunities for data



By transforming pseudonymised WiFi connection data into movements could this help us

- Provide better information to customers for journey planning and avoiding congestion?
- Operate and manage our stations better?
- Plan timetables, upgrades etc. more efficiently?
- By measuring footfall, could we generate additional income to reinvest in our services?

Privacy approach

Scenario 3: Wi-Fi connection on Tube – TDM

Clear and transparent purpose and benefit for data collection

What's working:

- Positively received and anticipated use, customers suggested this as an application of technology before they saw the example
- Provides a concrete benefit for customers, contextual information will help ease pain point of overcrowding, and allow them to make decisions
- Provides a clear and transparent purpose for data collection, and is anonymised, playing privacy concerns some customers have

Watch out:

- Potential risk of this highlighting TfL's challenges and frustrating customers (particularly during busy periods where it may provide less value to customers). May require carefully tailored comms

CityMapper helps you which is the best busy part of the train - it's handy

I like that one / would just wait for the next train / hate the crowded train

What's that going to tell me of if I sit at these stations, or there are crowded?

Wi-Fi location analytics

ico.

Communications

WiFi trial to help give customers better journeys

17 November 2016

Four weeks trial collecting de-personalised WiFi connection data will help TfL better understand how passengers move through stations and cross change between lines

"This trial is successful, data could be used to improve services, provide better travel information and help prioritise investment across the Tube network"

"This short trial will help us understand whether WiFi connection data could help us plan and operate our transport network more effectively for customers"

Skeshi Verma
Chief Technology Officer, Transport for London

Commuters to be tracked on the Tube through free WiFi

WiFi data collection

We are collecting WiFi data at this location to test how it can be used to improve our services, provide better travel information and help prioritise investment.

We will not identify individuals or monitor browsing activity.

We will collect data between Monday 21 November and Monday 19 December.

For more information visit tfl.gov.uk/privacy

Tube bosses to track commuters using wifi

15 November 2016

Transport for London @TfL 21h

We're running a WiFi data trial to help us better understand Tube passengers' movements through stations. Blog blog.tfl.gov.uk/2016/11/23/wif...

Sharing results

Review of the TfL WiFi pilot

Our Findings

content.tfl.gov.uk/review-tfl-wifi-pilot.pdf

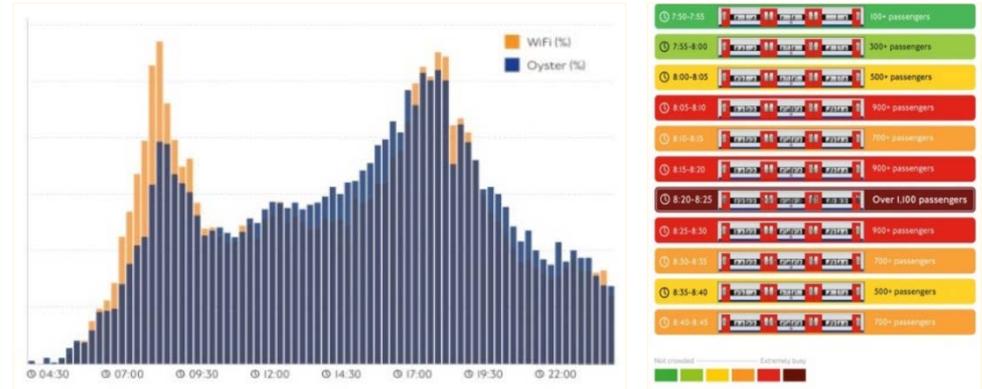
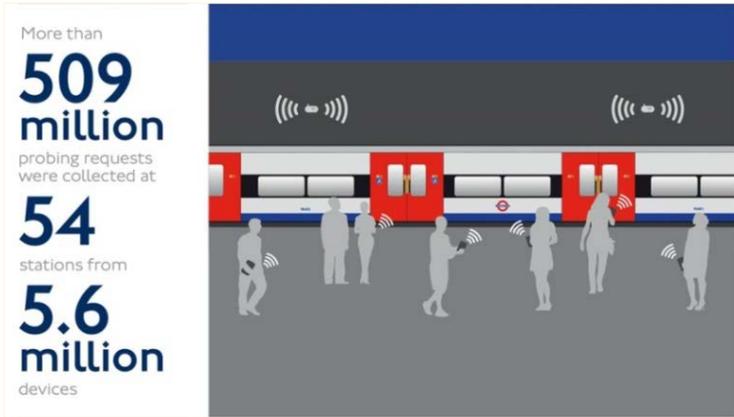


http

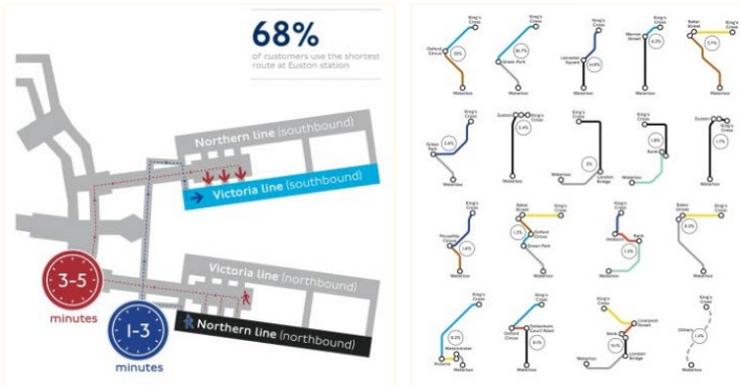
15 Data was depersonalised and analysed



To identify busy stations and trains



To highlight customer movements



And approach and results were positively received



"The transparency and openness shown by TfL is to be applauded. The steps taken to make customers aware of the data collection and its purpose should be seen as a blueprint for others."
— Sue Daley, techUK



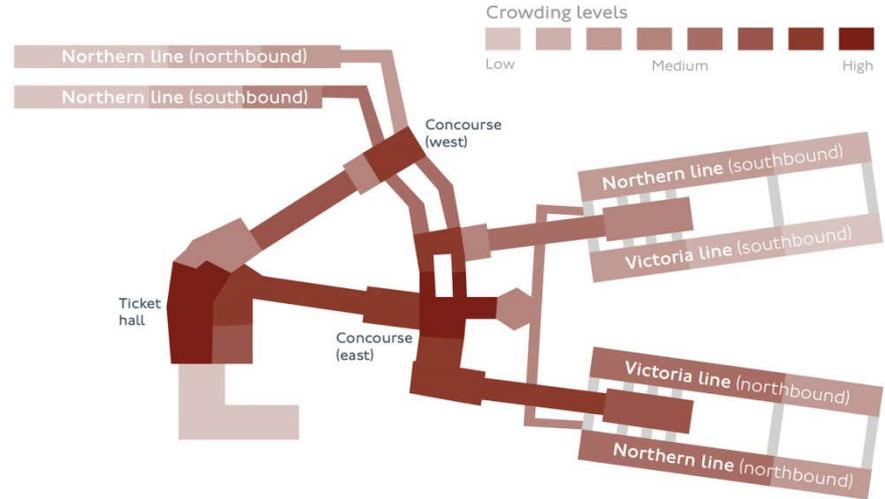
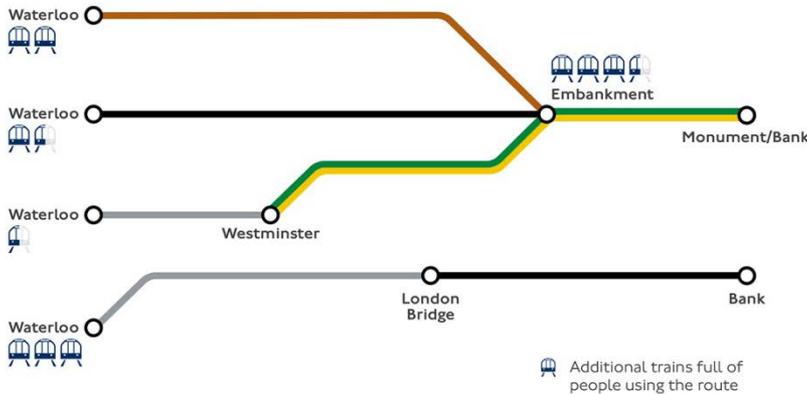
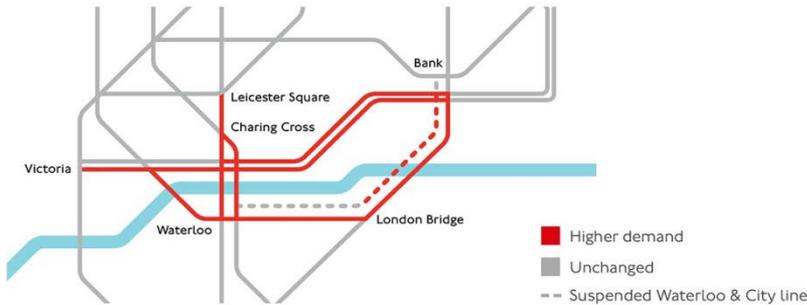
"The TfL Wi-Fi trial was a really good example of a public body coming forward with a plan, a new initiative, consulting us deeply and doing a proper privacy impact assessment."
— Elizabeth Denham, Information Commissioner



And showed potential benefits for customers and operations

08:00-09:00

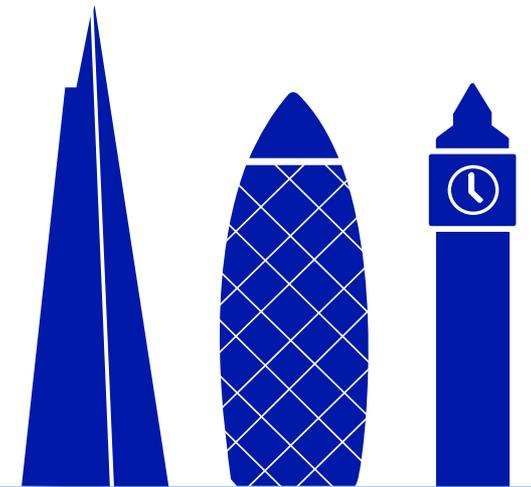
Waterloo & City line suspended, which led to customers making a number of different travel choices to get to Bank station



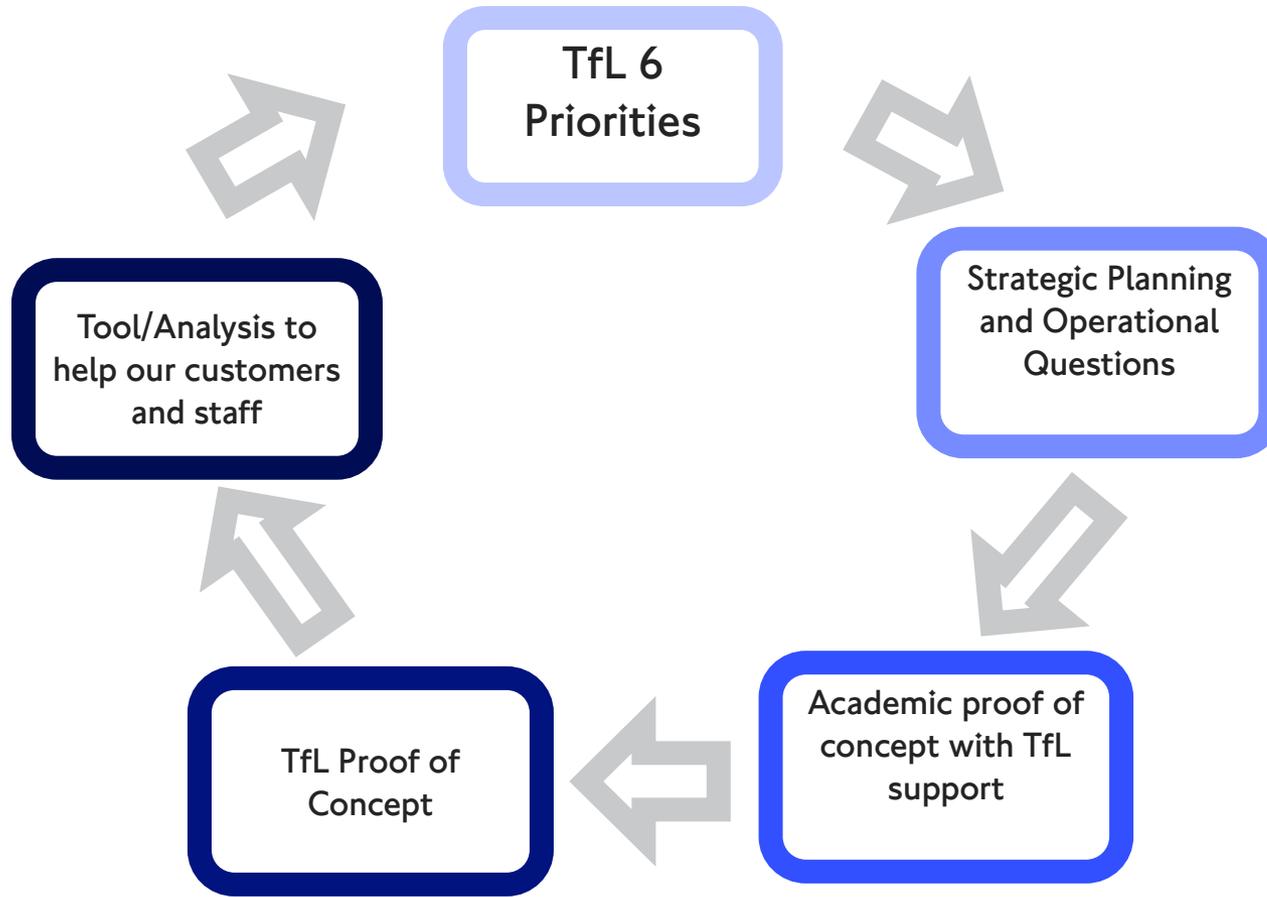
Walk times increased from **three minutes** at **18:00** to **more than 10 minutes** at **18:30** because of congestion



Working Together



Innovative & Productive Data Partnerships



Data Partnerships

- Our open data policy enables better access to information
- Over 650 apps powered by our data
- 14,400 open data users
- Over 200 elements included in the Unified API
- This has been delivered at very little cost
- Regularly used by 42% of Londoners
- Helps London's economy by up to £130m per year



My Big Data Principles

- Programme of work targeted to TfL priorities and draft Mayor's Transport Strategy
- Focus on the right questions and the problems you face. Interesting is not enough and don't start with the data.

As a [my job title]

I need [big data insights]

So that I can [make a decision my job expects me to]





Thank you

Lauren Sager Weinstein

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