

Innovations in London's transport: Big Data for a better customer experience

Lauren Sager Weinstein – Head of Analytics, Customer Experience
Transport for London

November 2015

Today's presentation – agenda

1. About TfL
2. Our Big Data
3. Case studies on customer benefits

Our purpose



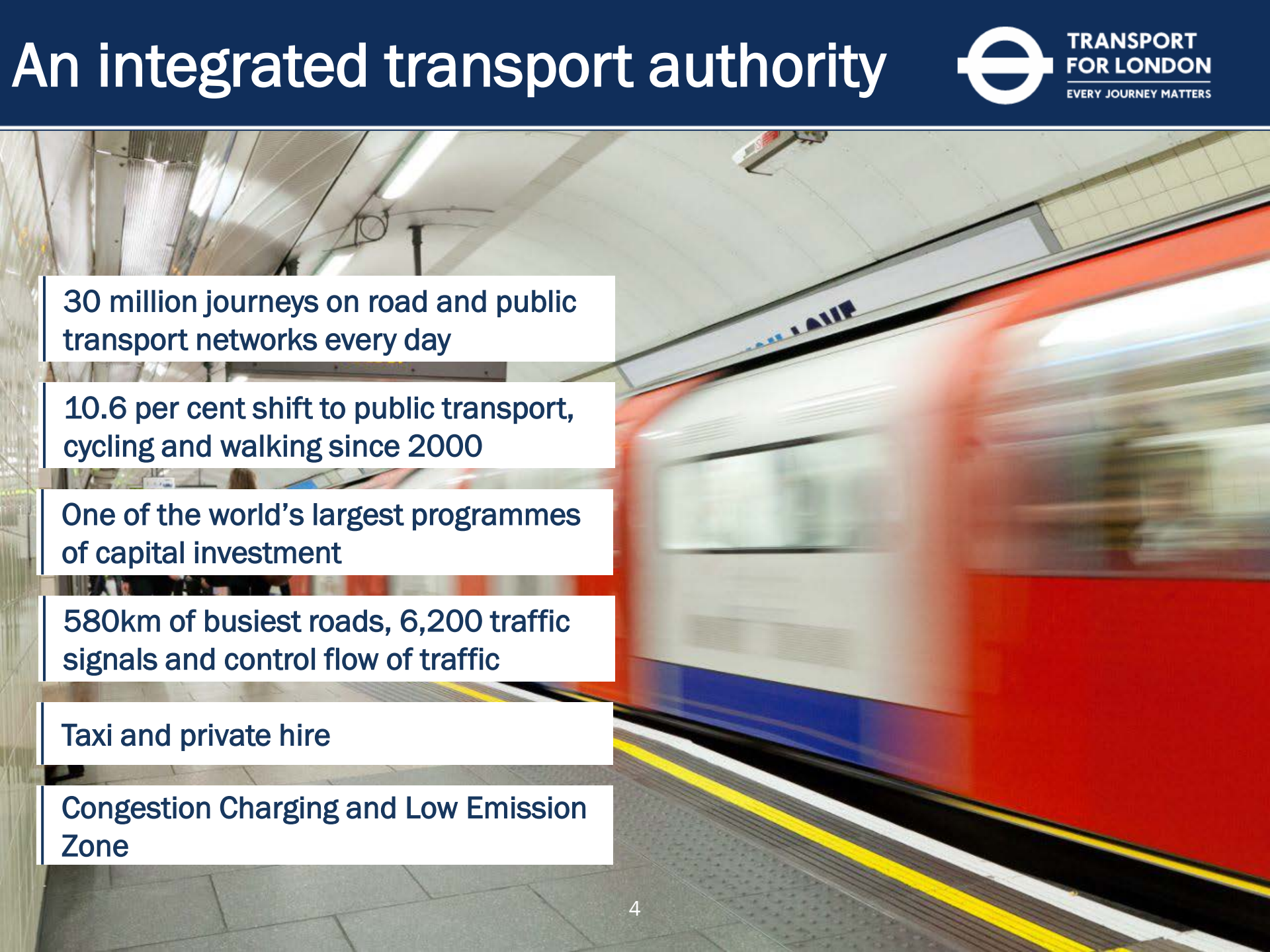
‘Keep London working and growing and make life better’

Plan ahead to meet the challenges of a growing population

Unlock economic development and growth

Meet rising expectations of our customers and users

An integrated transport authority



30 million journeys on road and public transport networks every day

10.6 per cent shift to public transport, cycling and walking since 2000

One of the world's largest programmes of capital investment

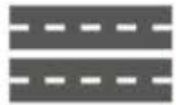
580km of busiest roads, 6,200 traffic signals and control flow of traffic

Taxi and private hire

Congestion Charging and Low Emission Zone

Number of journeys made in 2013/14

Roads (minus Taxi/PHV)



3.65bn

Buses



2.4bn

London Underground



1.26bn

Cycling



205.3m

Taxi and PHV



147.5m

London Overground



135.7m

DLR



101.6m

Tramlink



31.2m

Rivers



8.6m

Santander cycles



8.2m

Emirates Air Line



1.5m

Dial-a-ride



1.4m

London is growing by...

9 new residents
every hour



That's a car load
every 26 minutes



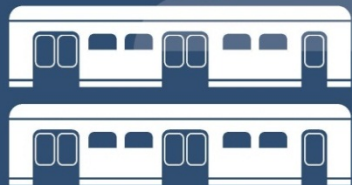
or

2 Buses
every day



or

2 Tube trains
every week



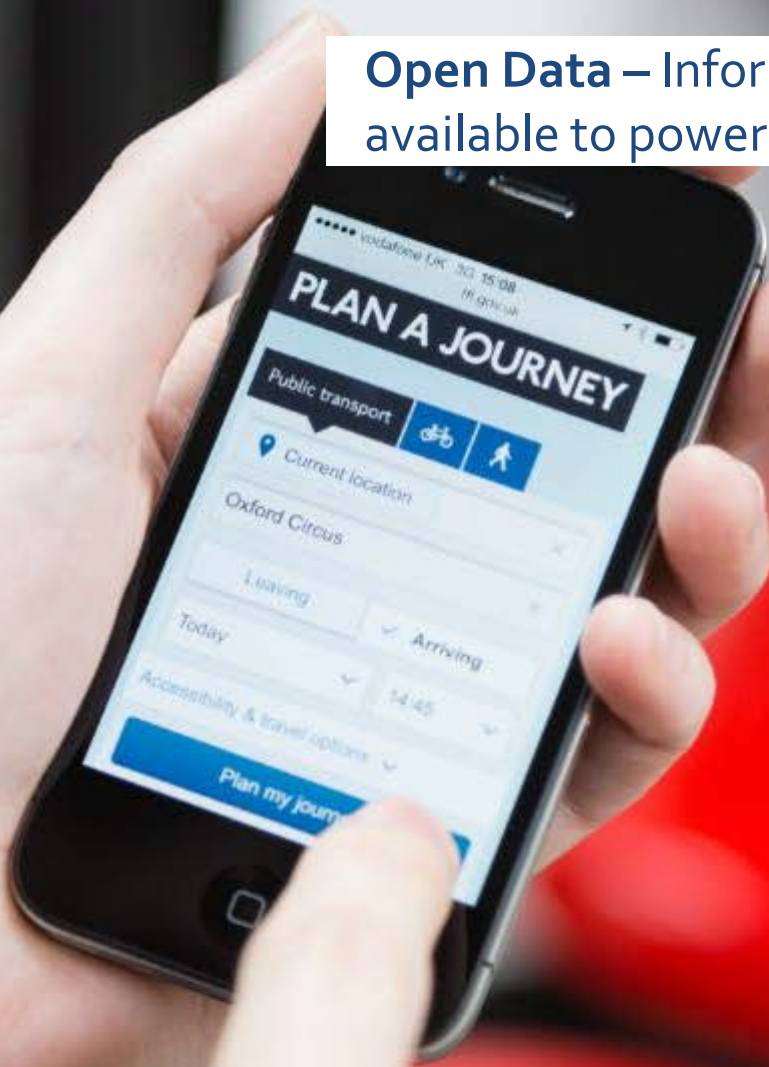
Today the population is

8,600,000

and by 2030, it will be

c. 10,000,000

Integrated customer information



Open Data – Information that we make freely available to power travel information apps

460 travel apps powered by open data

Alongside TfL issued info

2.9 million social media followers

12 million users a month to tfl.gov.uk

260 million emails in 2014

TfL's Big Data



Oyster and
contactless cards

Big Data - The analysis of one or more large data sets to reveal patterns or trends and enable action to be taken



Bus location data

Big
Data



Traffic information



Social media



Asset Data

Tailored Customer Travel Info

260 million
emails sent
in 2014

Integrated roads
& public
transport
message reaches
2m customers
every week

Key sources: Oyster
Contactless Congestion
Charge
Cycle Hire
Registered cyclists



83% of customers rate the
email service as useful or
very useful



Message content is often tailored to customer journey patterns

Big Data for Bus Network

Planning



A customer taps an Oyster card on the reader, which records the location and time.

Can we infer the exit point?



Bus events are recorded in the iBus system and we can match this with our Oyster data

Working with MIT we built an algorithm that joins the data from these systems together

Where is the next tap?

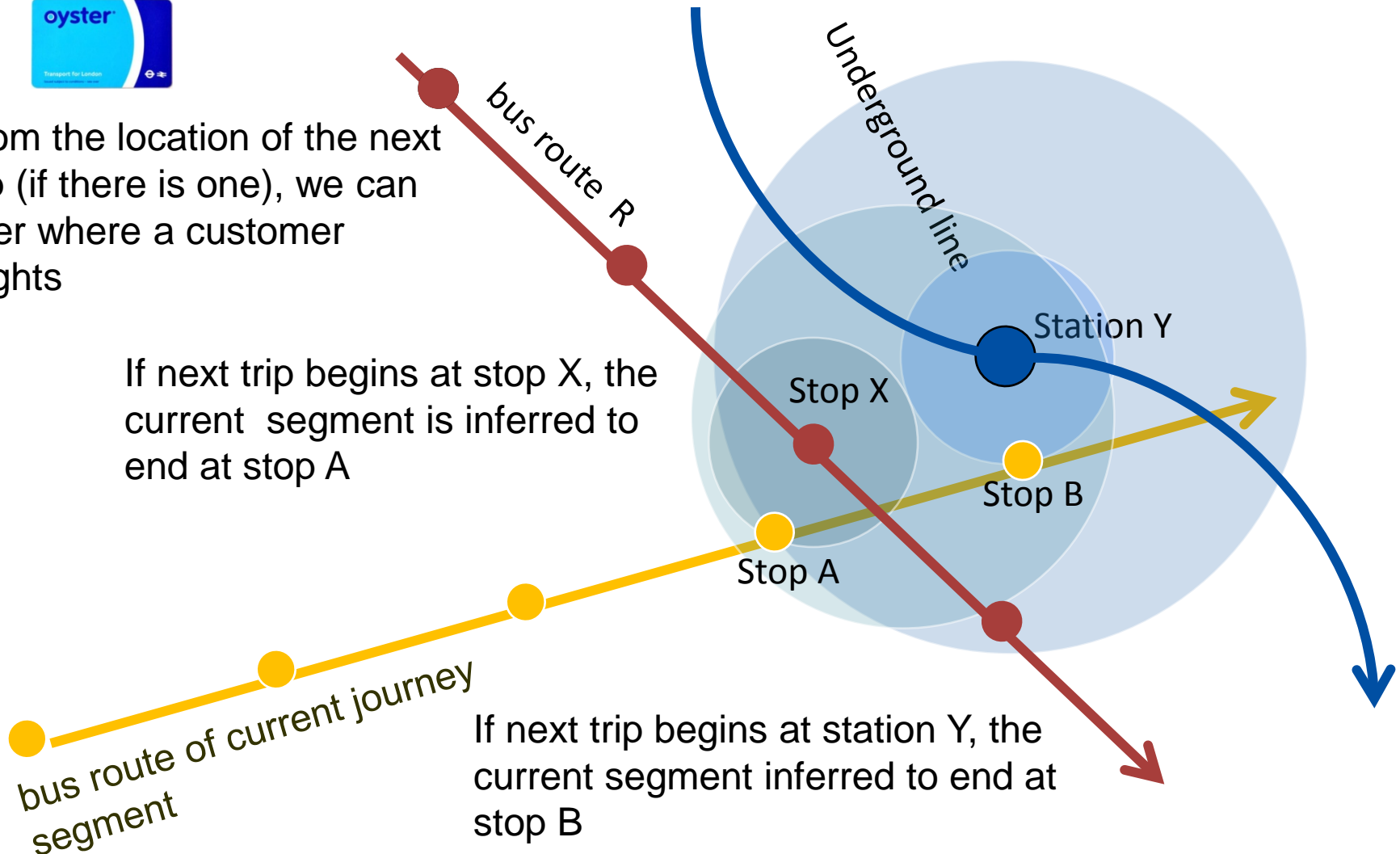


From the location of the next tap (if there is one), we can infer where a customer alights

If next trip begins at stop X, the current segment is inferred to end at stop A

bus route of current journey segment

If next trip begins at station Y, the current segment inferred to end at stop B



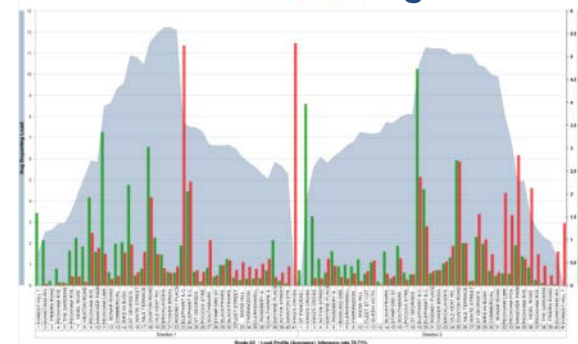
ODX Applications

A range of applications use ODX, to plan the bus network and enhance customers travelling experience. ODX allows for new and innovative solutions to our business questions.

Capacity Planning

Stop Name	Bus Trip Number - Route 468 (Load percentage)															
	13	15	17	19	21	23	25	27	29	31	33	35	37	39		
SWAN & SUGAR LOAF	3%	4%	3%	7%	2%	0%	9%	1%	3%	0%	9%	7%	4%	11%		
COOMBE ROAD	3%	4%	3%	7%	2%	0%	8%	0%	3%	0%	9%	6%	4%	11%		
CROYDON FLYOVER	4%	7%	7%	8%	2%	3%	9%	2%	3%	1%	10%	13%	4%	16%		
CROYDON LIBRARY	9%	8%	12%	11%	8%	7%	15%	3%	10%	3%	10%	24%	12%	31%		
WHITGIFT CENTRE	9%	8%	12%	11%	7%	12%	20%	9%	11%	3%	10%	30%	24%	37%		
DELTA POINT	8%	10%	15%	16%	11%	15%	21%	11%	11%	10%	7%	35%	25%	48%		
BEDFORD HALL	8%	11%	16%	16%	13%	15%	22%	12%	13%	13%	7%	35%	29%	53%		
HOGARTH CRESCENT	8%	12%	18%	16%	15%	15%	22%	12%	14%	17%	7%	38%	30%	62%		
DEVONSHIRE ROAD	12%	13%	18%	20%	16%	16%	28%	19%	15%	22%	9%	49%	35%	69%		
THE CRESCENT	15%	15%	20%	20%	16%	18%	28%	20%	15%	28%	8%	49%	35%	70%		
PAWSONS ROAD	15%	18%	21%	24%	21%	19%	33%	26%	17%	35%	10%	55%	36%	74%		
TALBOT ROAD	16%	19%	25%	28%	28%	30%	38%	28%	24%	47%	11%	63%	38%	80%		
CLIFTON ROAD	19%	19%	27%	30%	28%	31%	38%	29%	25%	52%	11%	65%	39%	80%		
PARK ROAD / SELHURST PARK STADIUM	19%	20%	28%	31%	30%	34%	38%	35%	25%	56%	12%	66%	40%	79%		
WHITWORTH ROAD	21%	21%	30%	36%	31%	36%	40%	37%	28%	62%	13%	66%	40%	79%		
HOWDEN ROAD	21%	24%	29%	40%	31%	37%	43%	37%	30%	9%	61%	65%	44%	78%		
WHARNCLIFFE GARDENS	22%	25%	30%	42%	31%	38%	44%	38%	30%	10%	61%	65%	46%	76%		
GRANGE AVENUE	22%	25%	30%	43%	31%	39%	44%	38%	30%	10%	61%	65%	46%	75%		
SOUTH NORWOOD HILL / ALL SAINTS CHURCH	24%	26%	33%	46%	33%	40%	47%	40%	30%	15%	61%	66%	49%	76%		
UPPER BEULAH HILL	21%	26%	36%	46%	33%	43%	49%	43%	30%	17%	60%	66%	53%	76%		
BEULAH SPA	24%	28%	39%	62%	34%	52%	52%	45%	29%	25%	60%	70%	55%	81%		
HERMITAGE ROAD	24%	28%	40%	65%	35%	52%	54%	45%	29%	29%	58%	69%	57%	80%		
CONVENT HILL	25%	29%	44%	70%	36%	53%	54%	46%	29%	30%	58%	67%	58%	80%		
BIGGIN HILL	26%	33%	44%	71%	37%	54%	54%	51%	29%	30%	58%	64%	55%	80%		

Business Intelligence



Travelcard apportionment



Interchange Analysis



Major Bridge Closure



- Summer **2014**: Wandsworth Borough Council had to **close Putney Bridge** for emergency repair work.
- Bus services had to stop either side of bridge. People could walk or cycle across.



- We used Oyster taps and iBus location data to predict how many bus passengers affected

Analytics in Action – Putney Bridge



- Approx **40,000** unique Oyster made **111,000** bus journeys a week that crossed the bridge
- Roughly **half** of these journeys **started or ended very close to the bridge**, so no bus transfer necessary.

- **56,000** journeys crossed the bridge in the middle of a trip. These would require two bus trips, one either side of the bridge
- Result: arranged to offer transfer facilities so that customers would not be charged twice
- Sent **targeted emails** to provide customers with information about alternative routes to **minimise** the impact

Capacity Planning

Route 359

Proposed extension to Purley



Using ODX the bus network serving New Addington has been completely restructured to better serve passenger needs.

Automated fare refunds

Revenue collection

Operational issues or
customer mistakes

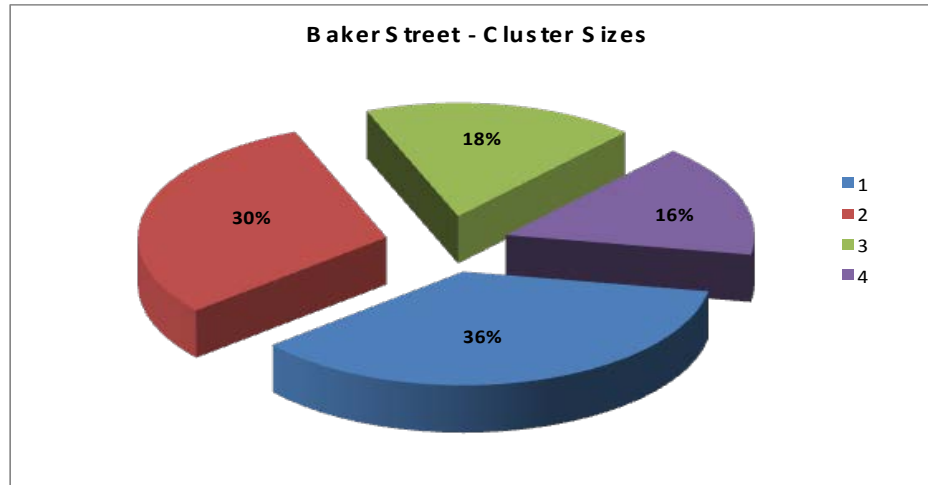


Automated refunds

Pattern matching

Sometimes things go wrong and we refund fares

Customer Segmentation at Stations



Cluster	Description	Median Start Time	Journeys / travelled day	Ratio unique stations / days travelled	# of Regular Days	# of Irregular Days	Cluster Sample Size
1	Regular Frequent User	08:11	2.5	0.7	11.6	4.6	36%
2	Occasional User (Resident)	12:53	1.9	1.3	2.5	3.6	30%
3	Irregular Frequent User	11:50	2.6	0.9	4.1	12.1	18%
4	Occasional User (Visitor)	11:01	3.4	3.1	1.9	2.0	16%

Our analysis of journey records helps us understand the types of customers who use our stations. This helps us plan ticket facilities, signage and commercial offering.

Influencing Travel

Leaflet

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.

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

MAYOR OF LONDON

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

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Sign up for email updates
tfl.gov.uk/emailupdates

[@TfLTravelAlerts](https://twitter.com/TfLTravelAlerts)

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

Whiteboard poster

Highbury & Islington station

New or occasional customer at this station?

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

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

Email

Are our new emails displaying well on your device? If not, allow images or view online

Home Plan journey Status update Tube

TUBE

Dear seed email recipient,

I am writing to share some new analysis on Oxford Circus station.

Every Tube station is different and research shows that over 75% of Oxford Circus customers do not use the station regularly and so may not know that the very busiest part of the peak time at this station is from 17:30 to 19:30. Anyone able to travel outside of this time could have a more comfortable journey.

More than a billion journeys are made on the Tube each year, with almost one million journeys made on the Central line each day. We know at certain stations and at certain times it can be very busy. That's why we are investing to improve the capacity and frequency of your Tube services.

For full details and to find out more about how we are reinvesting to improve your Tube, visit tfl.gov.uk/reinvesting-in-transport

We are carrying out a short 3 question survey on this email and we would welcome your views. To participate, please click the box below:

To feedback on this email, please click here

Yours sincerely,

Stuart Reid
Travel Demand Management Programme Director

Announcement

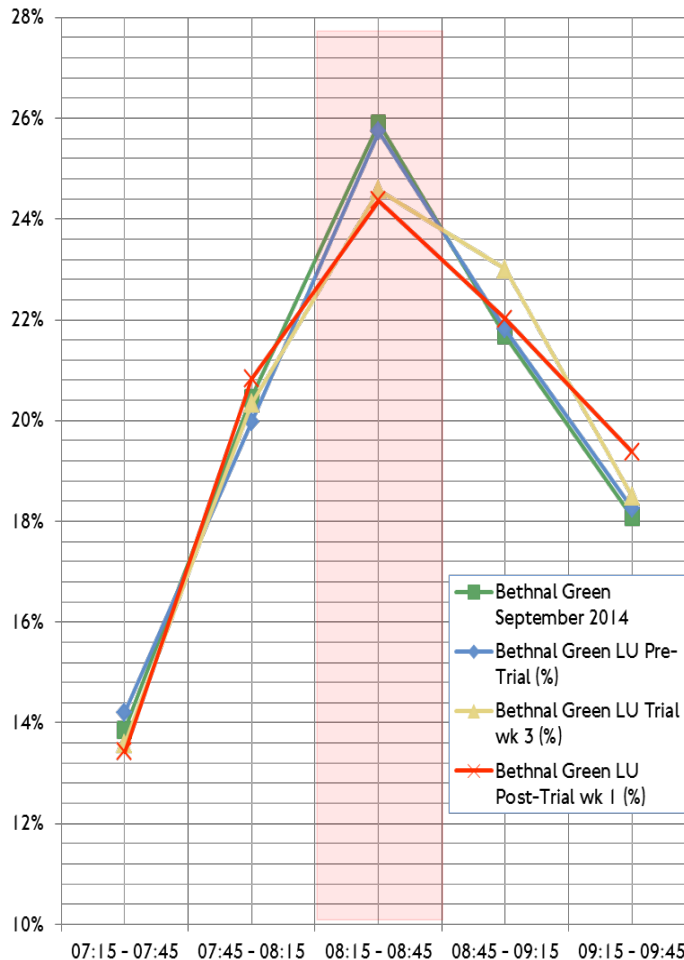
Leytonstone – to be played from 0800 – 0830

“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.

The busiest time here is between 08:15 and 08:30. If you are able to travel outside this time you could have a more comfortable journey.”

Bethnal Green Results

Proportion of demand between 7am and 10am in each period



Target Time Period

The results suggests change in passenger behaviour:

- Demand distribution over the peak period consistent between pre trial and September periods
- Approximate 5% shift in demand during target time period of 08:15 to 08:45.
- Total Peak Demand over the trial period relatively unchanged

What Next? Our Future Aims

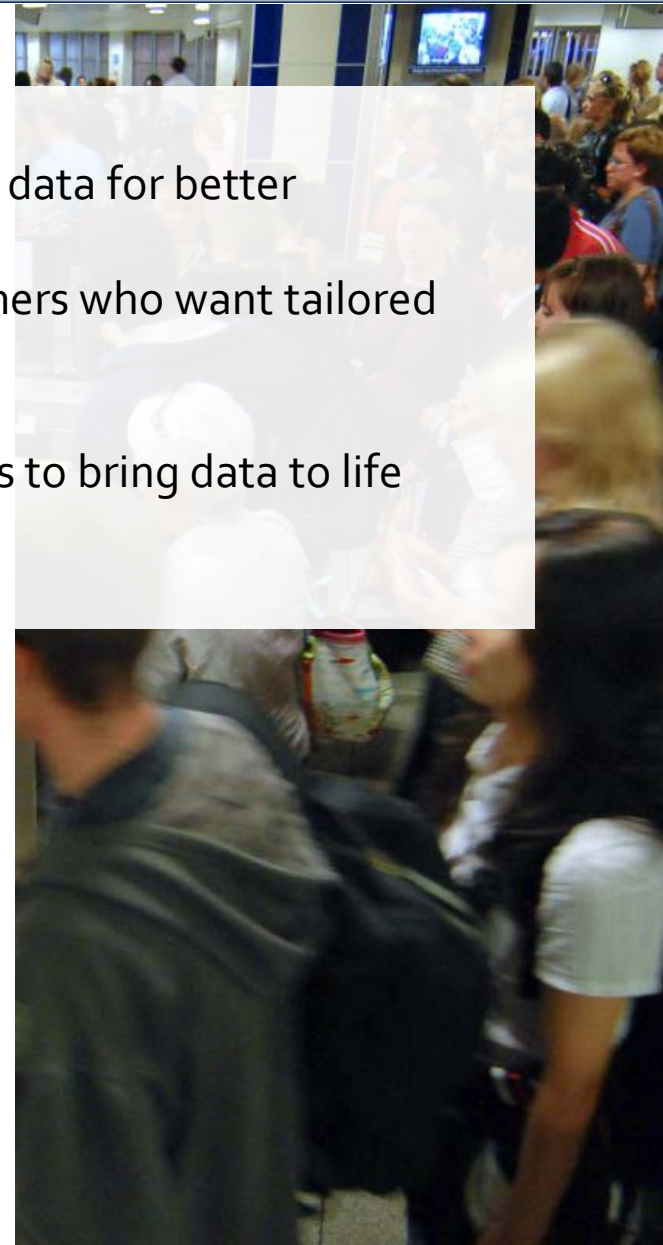
Many more topics and questions to explore!

Integrating ticketing, bus, traffic congestion, and incident data for better performance of the bus and road networks

Developing further personalised services for those customers who want tailored information

Predicting platform and train congestion at stations

Using new data mining tools and geo-spatial visualisations to bring data to life





Questions

