Digital Bus Innovations

Debrief

December 2015
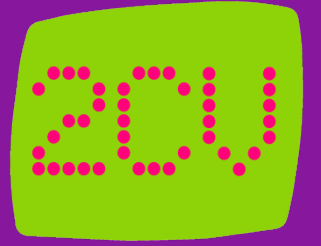
Transport for London

Contents
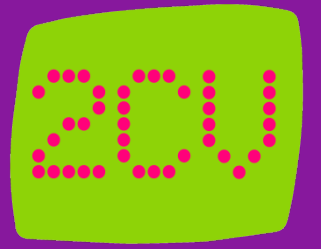
Background

Background to the Research

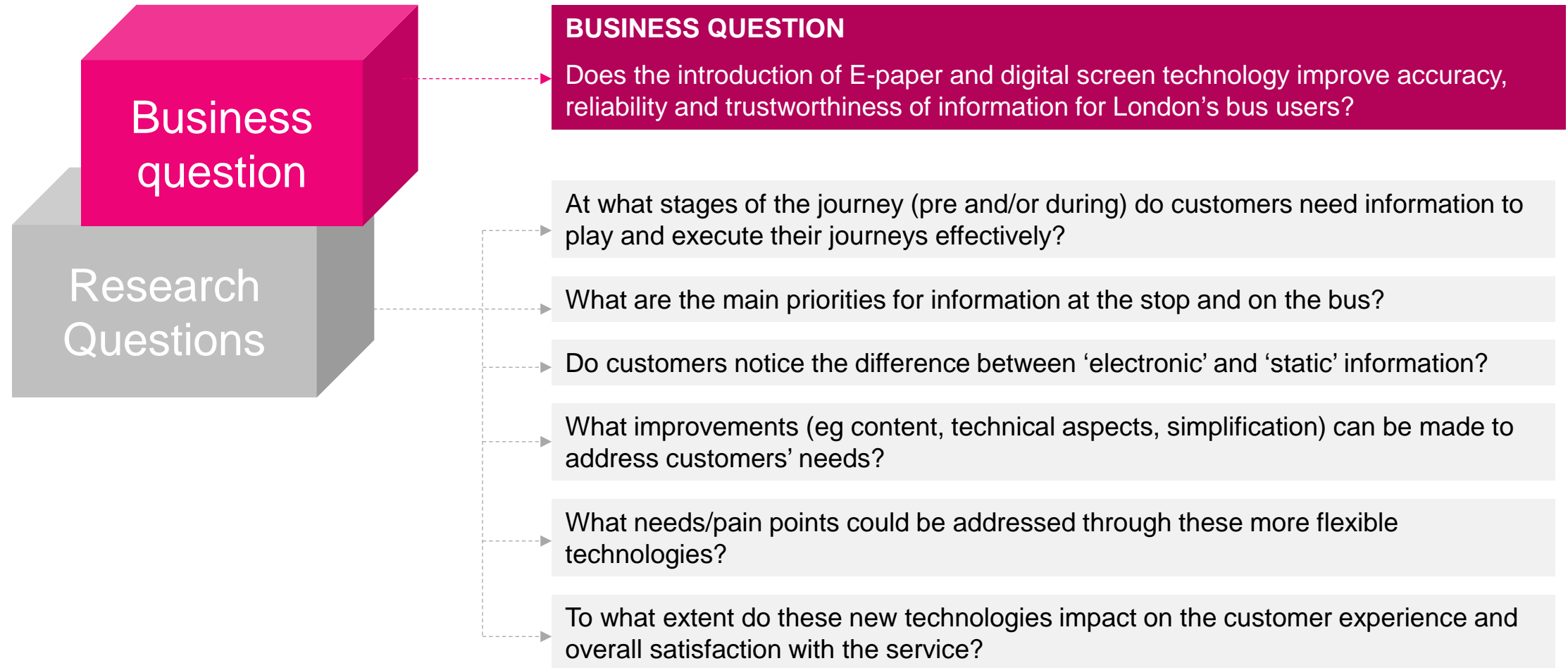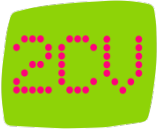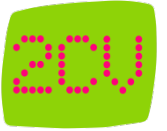Over the last few years, TfL have made significant improvements to London buses. At the heart of this has been providing customers with more trustworthy, reliable and accurate information, so that customers feel informed about when their buses will arrive and depart.

To date, this information has been served by the introduction of bus arrival technology at bus stops, digital screen in bus shelters and by the hundreds of bus mapper / arrival apps that TfL power.
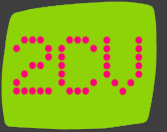
TfL are building on this success with new digital innovation that they are trialling at both bus stops and on buses. This new information will be based on three innovations: E-paper technology, digital signs (at bus stop and on bus.)

Before embarking on a wider roll out of this technology, TfL are keen to understand how this new technology can improve customers overall journey experience.
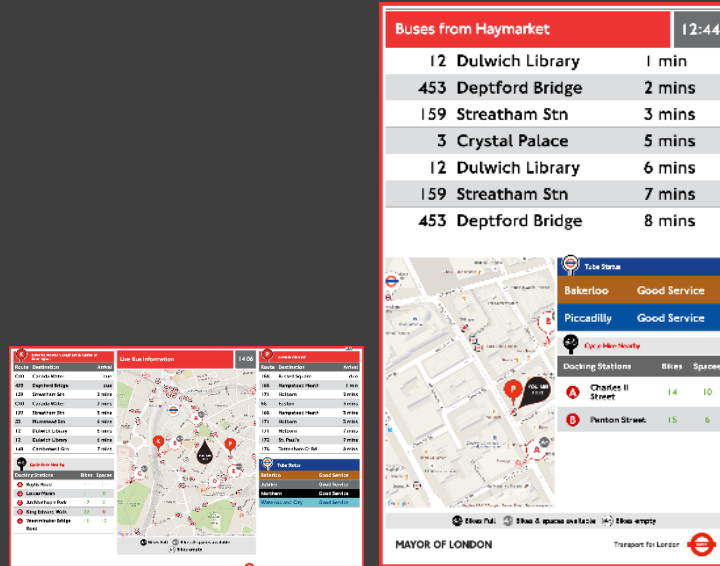
Objectives

Business question

Research Questions

BUSINESS QUESTION

Does the introduction of E-paper and digital screen technology improve accuracy, reliability and trustworthiness of information for London's bus users?

At what stages of the journey (pre and/or during) do customers need information to play and execute their journeys effectively?

What are the main priorities for information at the stop and on the bus?

Do customers notice the difference between 'electronic' and 'static' information?

What improvements (eg content, technical aspects, simplification) can be made to address customers' needs?

What needs/pain points could be addressed through these more flexible technologies?

To what extent do these new technologies impact on the customer experience and overall satisfaction with the service?

# What we explored

AT THE BUS STOP

ON THE BUS

E-paper timetable frames

The flexibility of E-paper displays enables information to be simplified, more accessible and targeted to specific journeys (eg timetables for day of travel only)
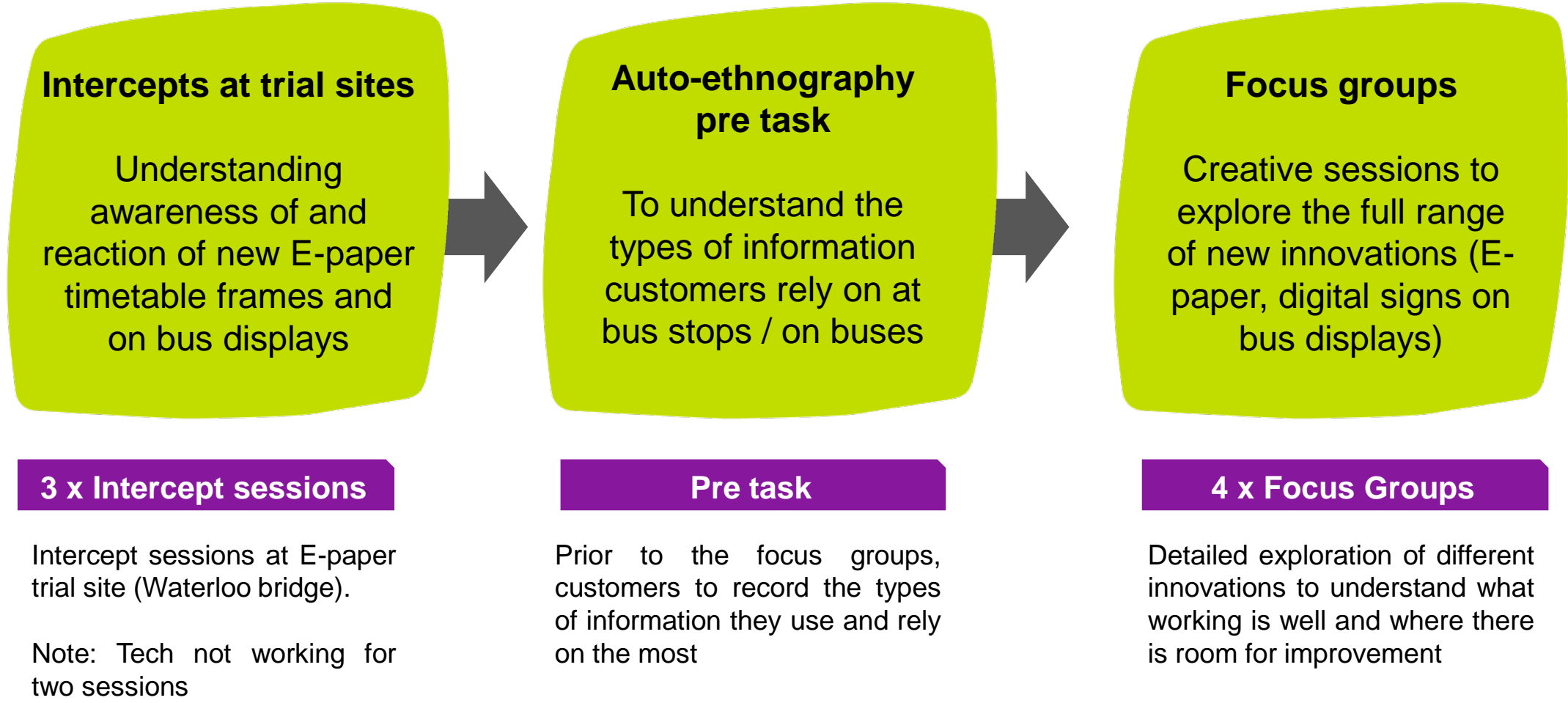
Digital signs in bus shelters

Richer display formats can provide local information that ties in with the whole journey experience – allowing customers to navigate from the stop and the location. Live information for other nearby mode options
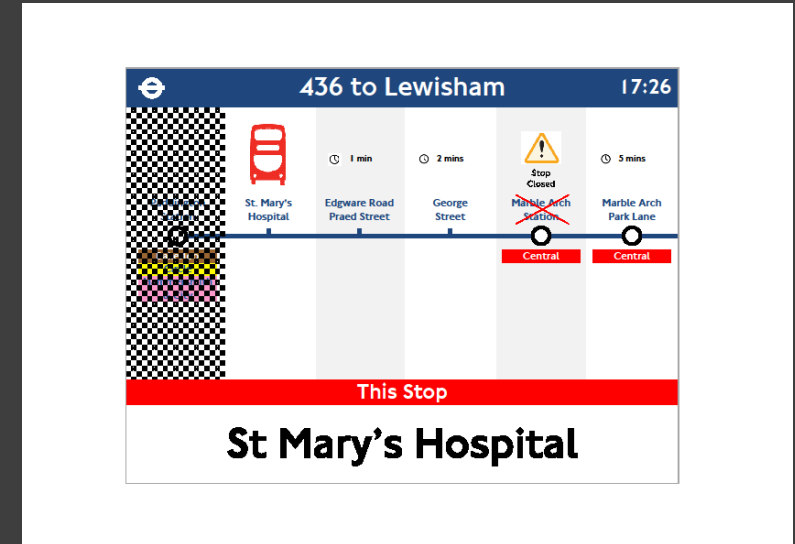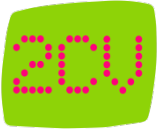
On bus displays

Information provided in easy to understand graphical format, flexibility to address issues such as service disruption information and other information relevant to the journey, eg interchange information
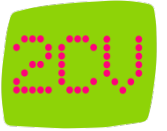
Methodology

2CV

Intercepts at trial sites

Understanding awareness of and reaction of new E-paper timetable frames and on bus displays

Auto-ethnography pre task

To understand the types of information customers rely on at bus stops / on buses

Focus groups

Creative sessions to explore the full range of new innovations (E-paper, digital signs on bus displays)

3 x Intercept sessions

Intercept sessions at E-paper trial site (Waterloo bridge).

Note: Tech not working for two sessions

Pre task

Prior to the focus groups, customers to record the types of information they use and rely on the most

4 x Focus Groups

Detailed exploration of different innovations to understand what working is well and where there is room for improvement

Research conducted among regular bus users

Sample

Group	Lifestage	Location	Frequency	Gender/SEG
1	Pre-family	Inner	Mix	Mix
2	Family	Inner/Outer	Mix	Mix
3	Family	Outer	Mix	Mix
4	Post-family	Outer	Mix	Mix

- Mix of Lifestage (pre family, family, post family)
- Mix of Gender
- Half to be regular bus users and half to be occasional bus users
- Good spread of social grade C1/C2/D
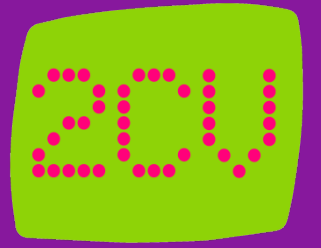
Headline Findings

Headlines

Customers prioritise two broad information needs at bus stops and on buses
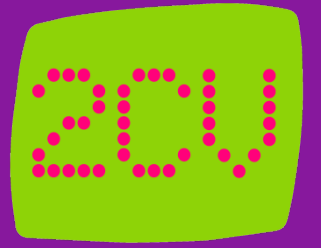
- They want to know **<u>when</u>** their next bus is coming and **<u>how long</u>** their journey will take.
- The latter is particularly important as journey times can be unpredictable and inconsistent (traffic, diversions etc) and information on this is not widely available.

Almost all of the new digital bus innovations meet customers' needs for more 'real-time' 'accurate' and 'trustworthy' information. Bus customers want an integrated (but not necessarily multi-modal) approach to other mode related information, so they are aware of any reasonable alternatives available to them should a disruption occur:

- **E-paper:** Feels innovative and the information is clearly presented. Live arrivals, journey length and planned disruptions is especially important.
- **On bus digital displays**: Customers appreciated seeing 'next stop' and more detail about the journey route. However, information on bus diversions lacked detail on the impact to journey time
- **Bus digital screens**: Generally felt that too much information was trying to be conveyed. Customers preferred bus information (live arrivals) to be prioritised over other modal information.

More could be done to inform customers about real-time journey length (how long)

- While this information is being served well through the static spider diagram (E-paper) and journey time to next stop (bus digital displays) customers expected more accurate information that took into account real-time delays and disruptions on London's roads.
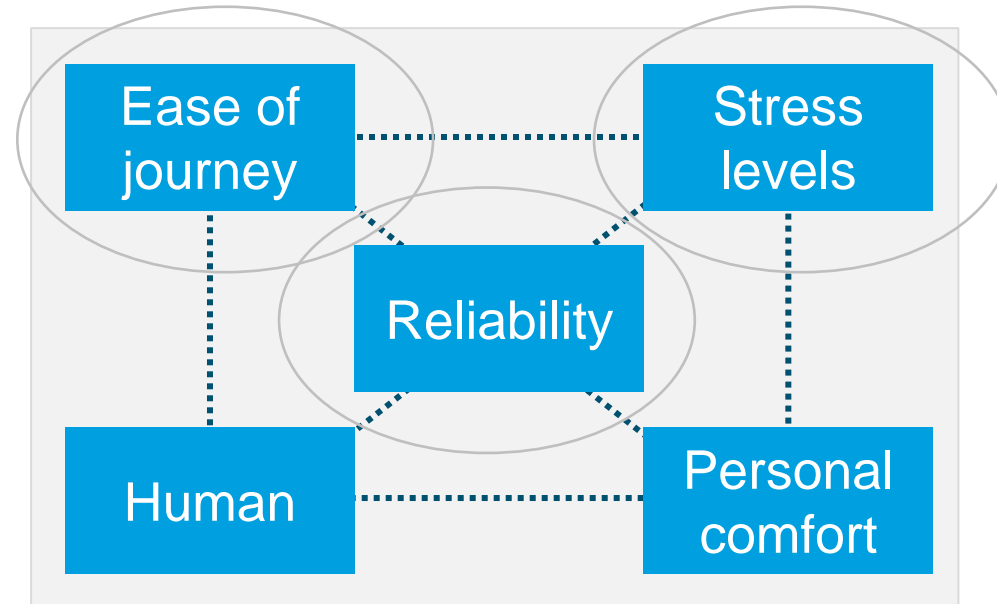
Understanding customer needs

Provision of accurate and reliable information is key to customers' journey satisfaction
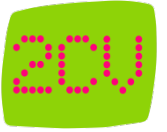
When I'm waiting for the bus, I find it really important to have an idea of **when** it will be arriving

Bus arrivals are good but they aren't always as accurate and reliable as I'd like them to be

It's really stressful to be in the dark about when your bus is coming, especially when you have kids with you - I really appreciate the bus arrivals and think there should be more!

I've recently started using an app called bus tracker and bus arrival which work quite well!

When I'm at a bus stop, I want to know when my bus is coming and I want an indication of how long it will take me to get there!

Ease of journey

Stress levels

Reliability

Human

Personal comfort

Information at bus stops and on buses is delivering to some of these needs well – strengthening overall customer satisfaction
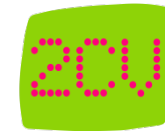
Live bus arrivals are seen as a reliable source of information

On bus LED displays, as well as auditory announcements are appreciated and are important sources of information
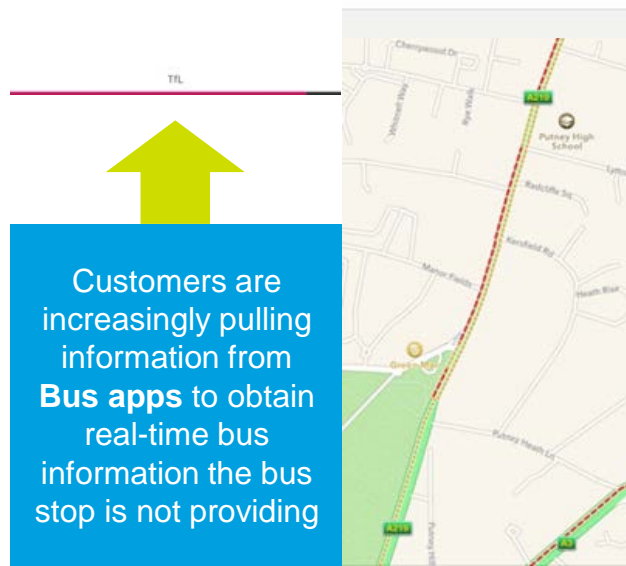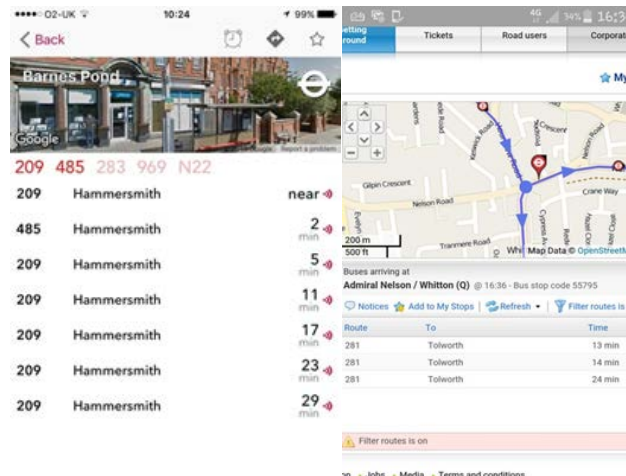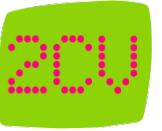
Customers are increasingly pulling information from **Bus apps** to obtain real-time bus information the bus stop is not providing
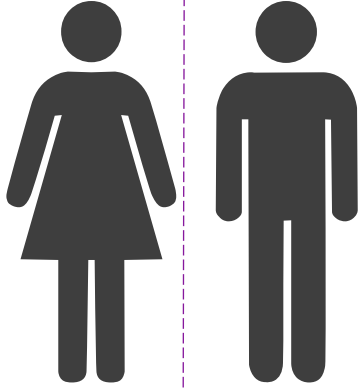
Timetables provide reassurance when no other information is available

However, customers increasingly expect more real-time information both at the bus stop and on the bus

BUS STOP

I want to know when my next bus is coming

I want to know how long it is going to take me to get to my destination

I'd like a more comprehensive route overview of where my bus is going and when it will arrive

I'd love to know if there was a way to let me know if there will be delays on my journey so I can plan to stay or get the bus depending on what's quicker

I'd like to see arrival timers at ALL bus stops - even residential ones

I use an app to let me know when my bus is coming – it has made travelling so much better!

I want to know how long it is going to take me to get home today!

Any bus diversion or traffic which could make my journey longer would be great to know in advance

This need is more pronounced for unfamiliar journeys and in less busy areas where there tends to be less information
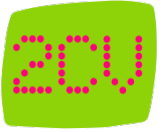
Unfamiliar Journeys

- With **new journeys**, **in unfamiliar locations,** there is a greater need for information

- Customers require information about
  - Route detail (stops along route, bus route)
  - Journey length

- This need for information is exacerbated in **less busy** areas where there is a greater lack of information

> When I don't know where I am going it is very important for me to get information at the bus stop about journey route and approximate time of trip

Familiar Journeys

- **Deep-rooted heuristic behaviours** associated with this type of journey means customers are less likely to need / use 'information'

- Information typically only looked for when **customers need to optimise time**
  - Finding the fastest route for destinations is increasingly a priority for most customers

> On journeys I take often I am less concerned with detailed information but I'd still like some idea of when my bus is coming

Overall, all three digital innovations were well received and felt to largely be meeting the need for more real-time information

On bus signs are meeting the need for more accurate real-time information on the bus and a better overview of journey (length and route)

Digital bus signs are meeting customers' needs for more accurate live arrivals and some desire for multimodal information
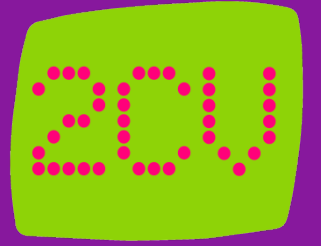
E-paper timetables are meeting the need for live arrivals, and estimated journey length

Response to E-paper

Customers responded really positively to the new E-paper timetables

✓ Timetable frames felt to be **modern**, **innovative** and an improvement on static frames
✓ Information provided is meeting **important needs** (when is my next bus coming, how long will my journey take?)
✓ Secondary information on planned disruptions and Tube status helped customers to **plan** for their journeys **more holistically**
✓ The information was **well presented** and **clear** to **understand**

I really like the live arrivals and would find it annoying if that screen would change when you press the button

I like the route overview and how it tells you how long it takes to each stop - so important when you don't know where you're going!

I love the live arrivals – it's so important to have these all over London, even in residential areas
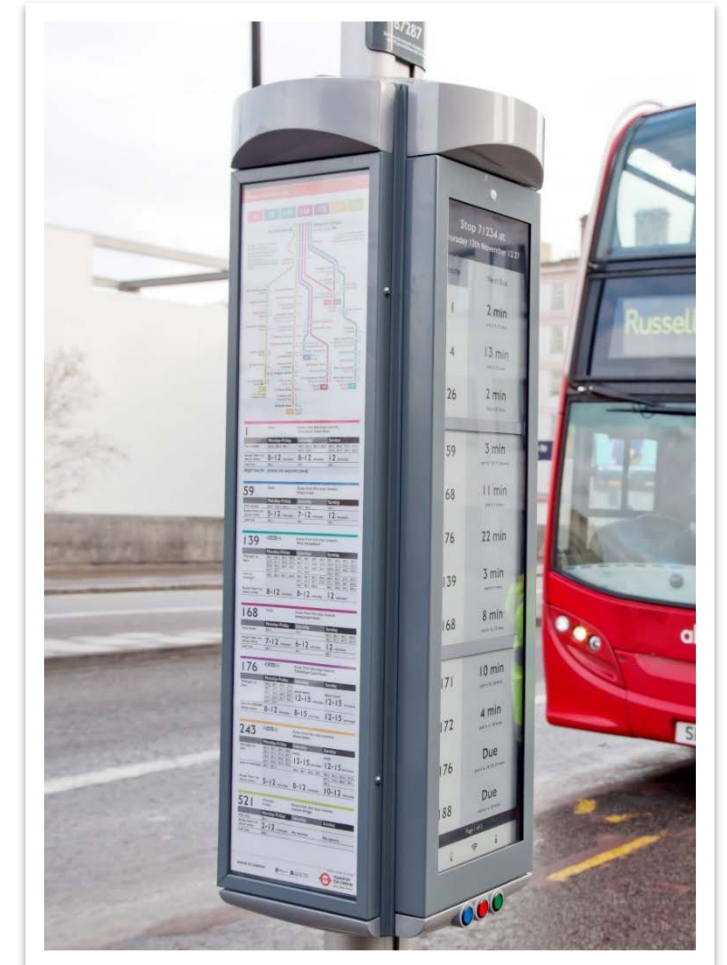
Information on E-papers felt easy to understand and well presented
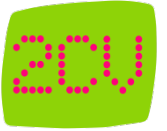
WHAT'S WORKING WELL … 👍

Live arrivals
- Information meeting an important need (when is my bus coming)
- Adds more specificity to what is currently displayed on bus arrivals eg last bus departed (colour coding of last bus liked)
- Flashes, screen refresh and times helps timetables feel real-time
- **Information clear** and **simple** to understand (feels intuitive)
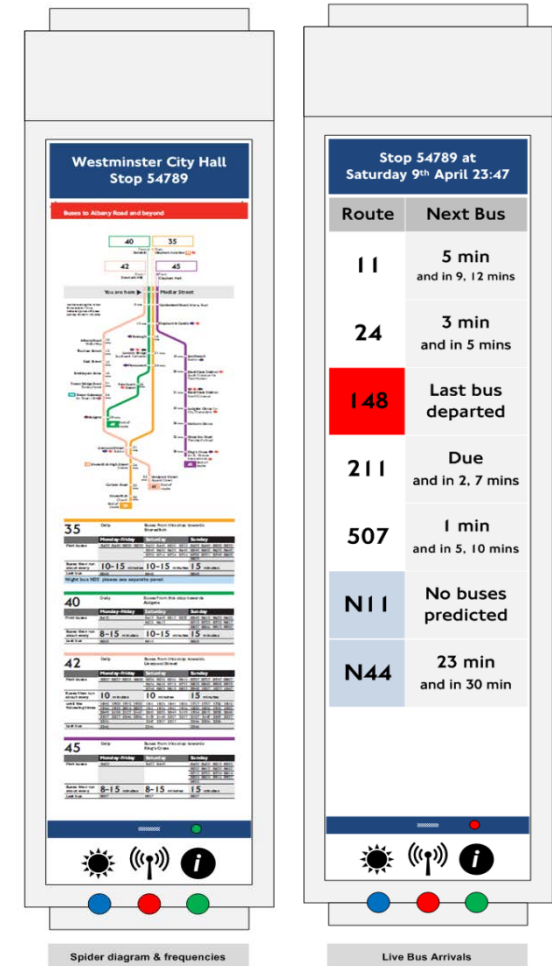- Customers felt **confident** and able to use the information

Spider diagram / static timetable
- Estimation of journey length and stops important to customers
- Spider diagram **easy** to **read** and interpret
- Colour coding of routes helps comprehension

> I like how it tells you the time between stops - that's reassuring when you're going somewhere new and aren't sure how long it will take
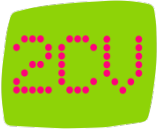
> I like how it's colour coded and gives you a bit of an overview of the stops on your route

> It's great that it doesn't just show you the next bus, but the few buses after that

Westminster City Hall Stop 54789
Buses to Albany Road and beyond

Spider diagram & frequencies

Stop 54789 at Saturday 9th April 23:47

Route	Next Bus
11	5 min and in 9, 12 mins
24	3 min and in 5 mins
148	Last bus departed
211	Due and in 2, 7 mins
507	1 min and in 5, 10 mins
N11	No buses predicted
N44	23 min and in 30 min

Live Bus Arrivals

E-paper timetables leaves customers feeling relaxed and in control of their journey

Local area information and links to other modes also appreciated

**WHAT'S WORKING WELL …** 👍

Planned disruptions
- Customers appreciated advance warning of planned disruptions
    - Enables them to make travel decisions more confidently
- Customers appreciated the yellow 'warning' colour and exclamation mark

Tube status information
- Customers liked having information about the Tube status as this could influence their travel decisions (especially in Central London locations)
- Looks and feel familiar and therefore simple and easy to understand

Local area map
- Customers liked having a sense of where they were geographically
- They appreciate knowing what other transport options are available nearby
- Map legible / easy to understand

Tube status and local area map felt most suitable for central London locations
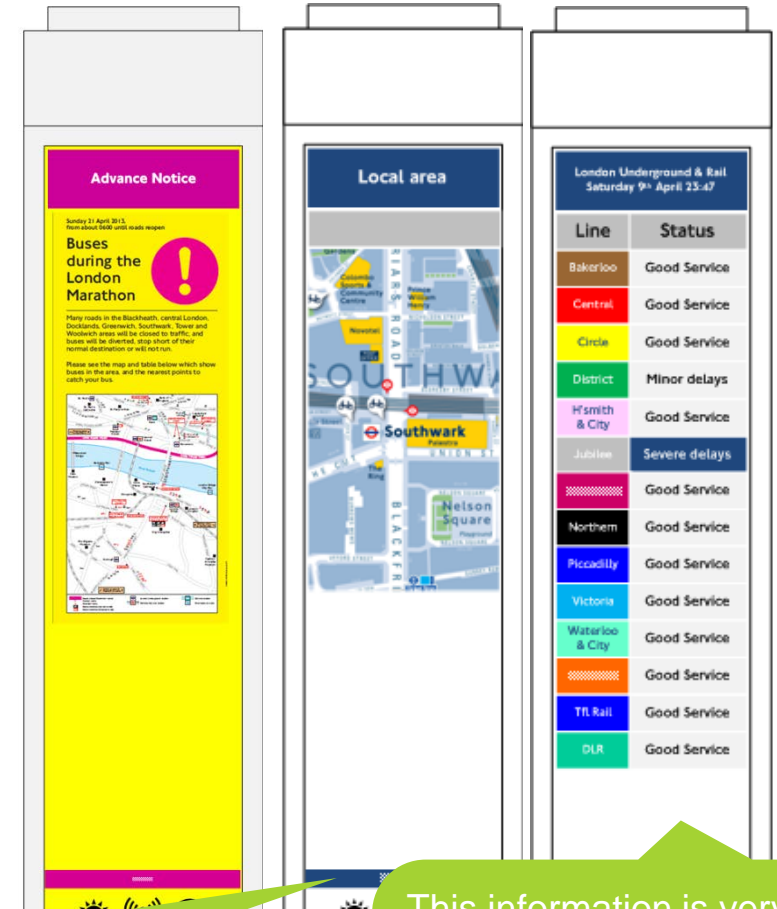
It's really important to know about disruptions ahead of time. This is great - it gives advance warning!

This information is very useful - you might be taking the bus to a tube station and it's useful to know your line is running well

Customers feel interactive buttons are somewhat outdated but appreciate the secondary information it allows them to access

- The interactive button was appreciated and customers liked the idea of having more information at a push of a button

- Customers liked the idea of having multimodal and local area information at the bus stop
  - Information about local events and news updates is appealing to some but not felt to be a priority for this information channel

- Concept felt a little outdated (expectation is more touch screen)

- Some concerns about 'getting in the way' of other customers, particularly at busy bus stops

- Some concern around whether the interactive button would rob people of primary information when pressed

I'm not sure I would press the button but I do like the idea of having additional information at a bus stop somehow
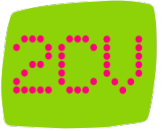
What do these buttons do? I don't think you'd bother pressing them at a busy bus stop

I think it's definitely useful to have information on other modes, especially in Central London

Essential that live arrival information is always available to customers

An expectation that the information will be accurate and up-to-date

Live arrivals

- High expectation that this is always accurate and up-to-date
- Some questioned how easy it would be to read the live arrival in crowds (in comparison to countdowns which is situated higher up)

Spider diagram / static timetable

- Detailed timetable information felt unnecessary (1st and last is sufficient)
- Information not new (but appreciated nonetheless)
- Text of static timetable felt small in comparison to bus arrival
- Static information felt more outdated in comparison to live arrivals

Local area map

- Some concerns over legibility and it being too small to read at the bus stops
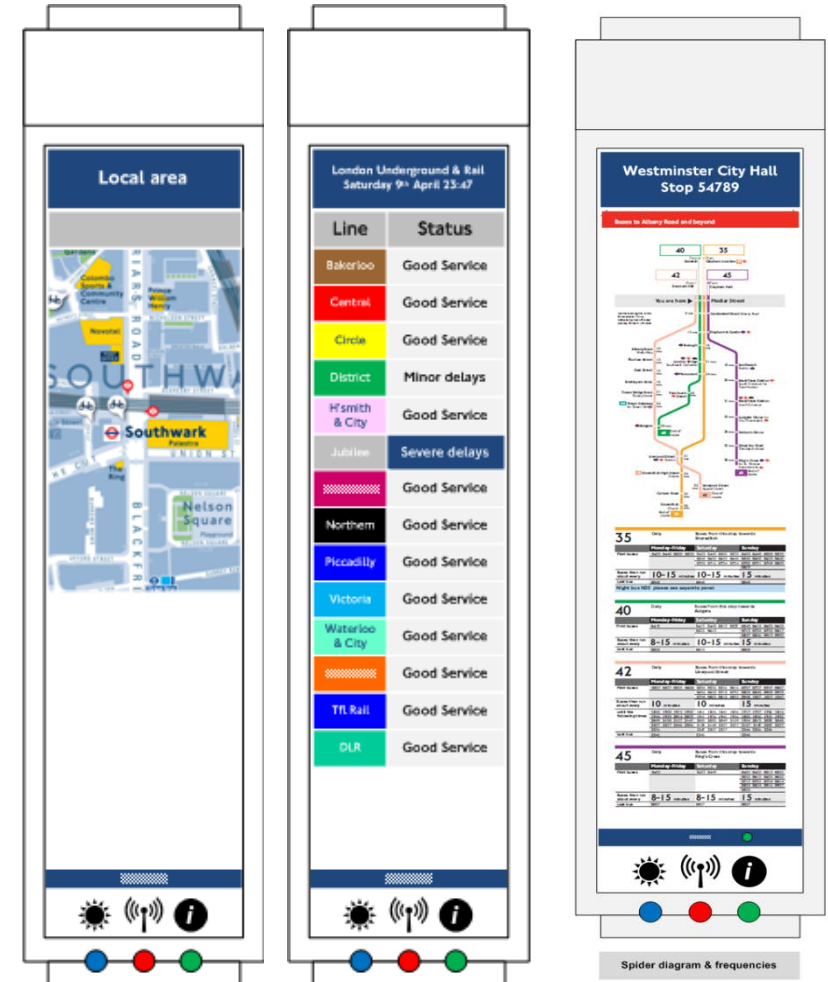
I'm a little bit worried that I wouldn't be able to read this from a distance

I'm not sure we need the diagram AND the detailed timetable below - just an overview of bus frequency would be enough for me
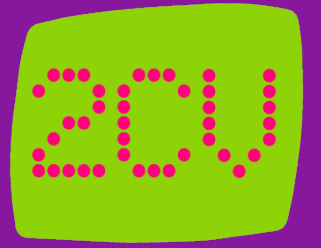
Response to digital bus signs

Customers appreciate the multimodal information digital bus signs offer, but feel bus information must be prioritised

- ✓ Live arrival information welcomed and should be prioritised in terms of space / simplifying information
- ✓ Multimodal information is appreciated and customers felt this could help them make better travel choices
- ✓ Use of flashing screens helped information feel real-time

However:

- ▪ Screens felt expensive and customers questioned their suitability / need at bus shelters
- ▪ They felt most effective at busy transport hubs where infrequent users may be looking for alternative modes to travel

In busy hubs I definitely would look at this and might decide to get the tube or even cycle if I'm alone

I appreciate what they're trying to do here but this feels like a very expensive piece of tech – not sure it's worth it

It feels a little bit like the Mayor is just trying to get us all to cycle!

Customers appreciate the live bus information and real-time feel to screens

Live arrival
- Felt to be the priority information and essential that other information does not get in the way / distract
  - Second iteration felt more intuitive / clearly presented
- The font size and colour scheme clear and simple to understand
- Arrival clock felt demonstrably live

Live bus information / map
- Customers liked seeing local area maps and where they were relative to other stations / landmarks

Tube status
- Tube status information appreciated and helps network to feel joined up

I like the idea of more live bus information and info on other modes

I like that the map tells you where they are - that's useful in unfamiliar areas

Some concerns that the digital screens are trying to convey too much information and bus not being prioritised

WATCH OUTS …

Live bus information / map
- Initially the amount of information felt overwhelming (too much and not clear what it was representing)
- Customers somewhat confused by how the bus stop numbers corresponded to the map
- Customers expected these signs to be interactive / touch screen

Cycle Hire
- Cycle hire information was met with some general scepticism
- Very few consider cycling instead of getting a bus
  - This is especially the case in winter- some customers expressed being more open to cycling in summer

I feel quite overwhelmed by the amount of different things on the screen! Are the buses going in different directions?

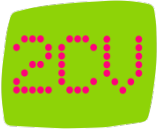*What are all the white things on the map and why are there so many?*

I don't understand where to find tube information on the map?

I don't quite understand how the P here corresponds to the P on the map
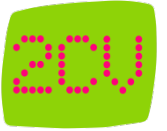
Response to the on bus signs

# On bus signs were felt to be meeting customer needs for more real-time and live information on buses

- Currently customers feel 'in the dark' on London buses, especially on less familiar journeys

  - Customers are largely self reliant on buses and listen out for auditory announcements

  - Journey times unpredictable and inconsistent

- There is a real desire for customers to have more information about **how long their journey will take** and to have a better **overview of upcoming stops**

  - On bus signs were felt to be a step in the right direction in terms of delivering to these needs

  - The additional Tube information is appreciated as customers feel this information can help them make better travel choices
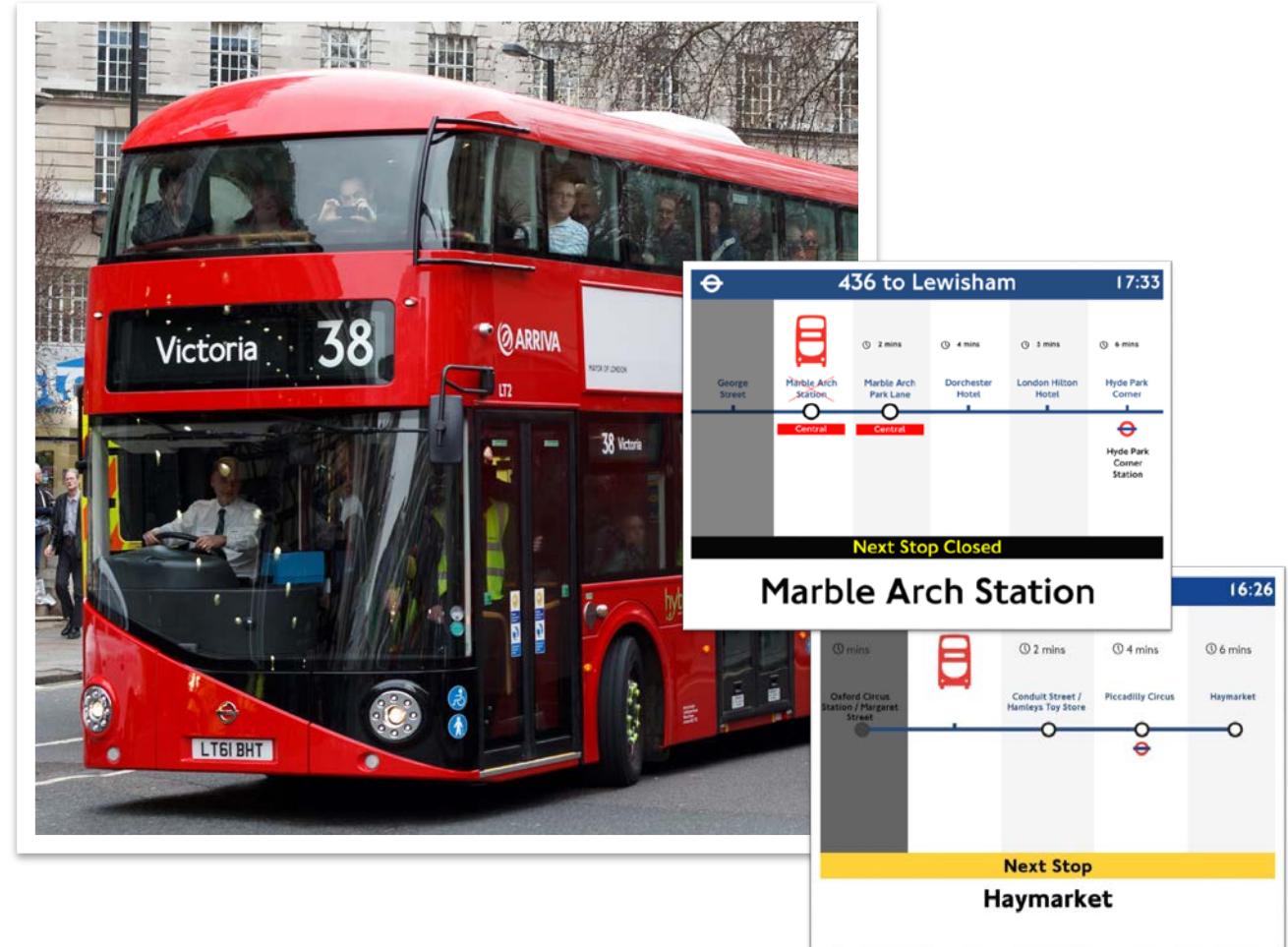
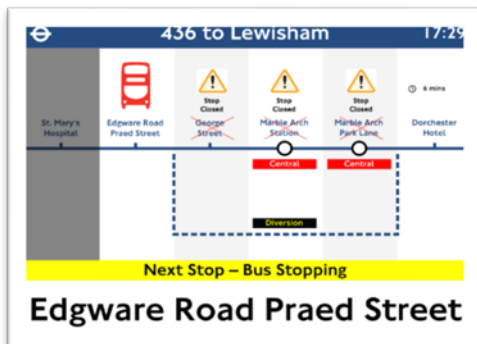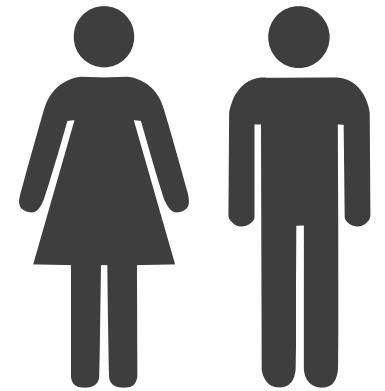# On bus digital screens have potential to fill an important information gap

Next Stop
Haymarket

Route Information: Information about stops and times to next stops helps customers feel more relaxed and informed about their journey

Next Stop Closed
Marble Arch Station
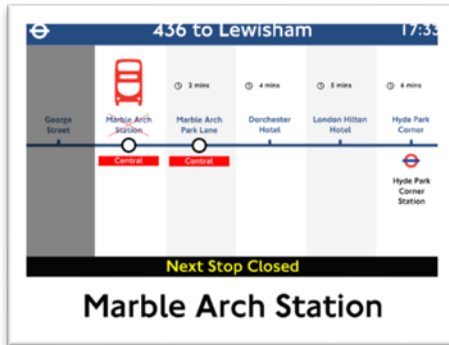
Tube status: Helps customers to think about their journeys in a more integrated way

Next Stop – Bus Stopping
Edgware Road Praed Street

Diversions: A really important piece of information as they have significant impact on journey length

I want to know how long it's going to take me to get to my destination
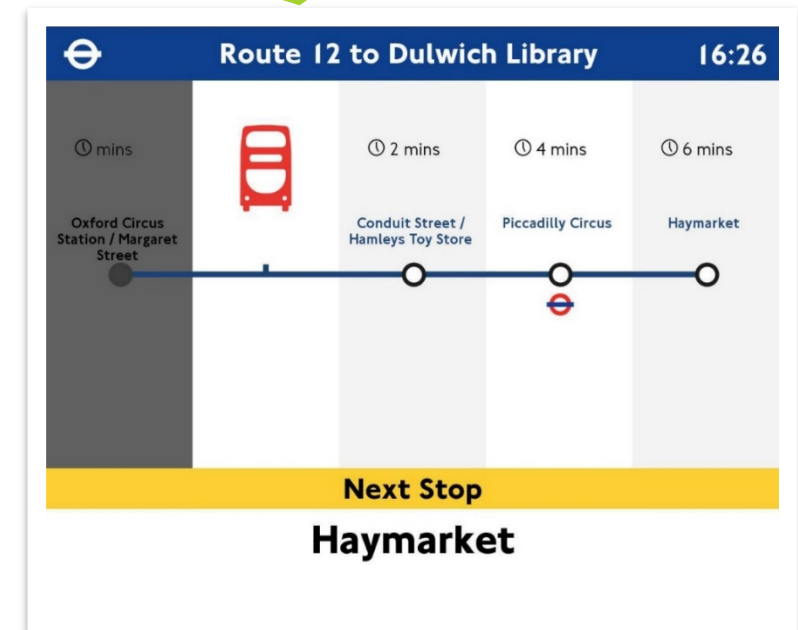
Bus Information Only

WHAT'S WORKING WELL …

- Overview of upcoming stops liked and appreciated
- Indication of travel time along the top was well liked and meets an important need (how long is my journey going to take)
- The layout felt intuitive and upcoming stops were easy to read
- Graphics clear and simple to understand
- Dynamic nature of the screens / clock helps it feel live and real-time
- Bus graphic liked (cute)

WATCH OUTS …

- Customers expected the timings displayed above stops to be real-time, not estimates or averages
- Customers expected information to be completely in sync with audio announcements
- Some customers preferred the bus graphic to be facing sideways, in the direction of travel

I like that it turns grey when you have passed the stop - that's very clear

Route 12 to Dulwich Library 16:26

| ⏱ mins | | ⏱ 2 mins | ⏱ 4 mins | ⏱ 6 mins |

Oxford Circus Station / Margaret Street

Conduit Street / Hamleys Toy Store

Piccadilly Circus

Haymarket

Next Stop

Haymarket

It's good that the font is quite big here, especially when you are sitting far away
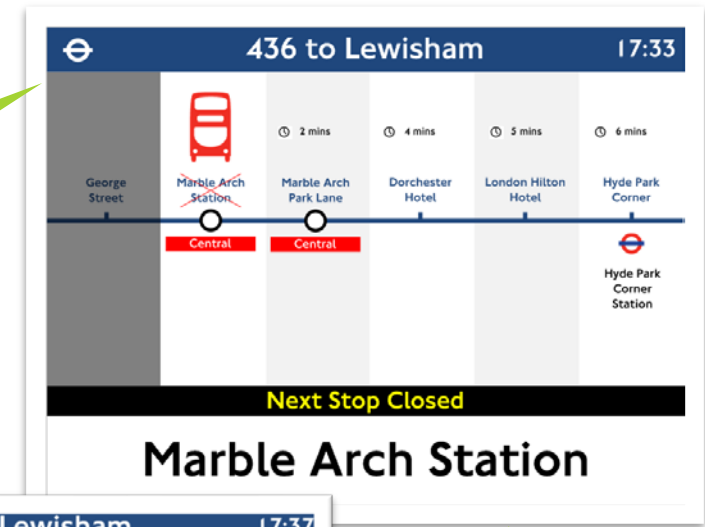
Tube status updates
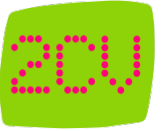
WHAT'S WORKING WELL …

- Integrating Tube status updates felt new and could help customers make better travel choices in the moment
- Good service message provides **reassurance** that network is working well
- Information presented clearly and easy for customers to understand

WATCH OUTS …

- Some concerns that bus stops with multiple Tube lines running through could be overwhelming and confusing
- Some concern around what would happen if there were disruptions / delays and how much additional information could be included to help people with their journeys
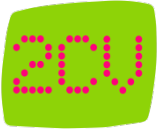
It's a good idea to show us at which bus stops you can get which line - so helpful!
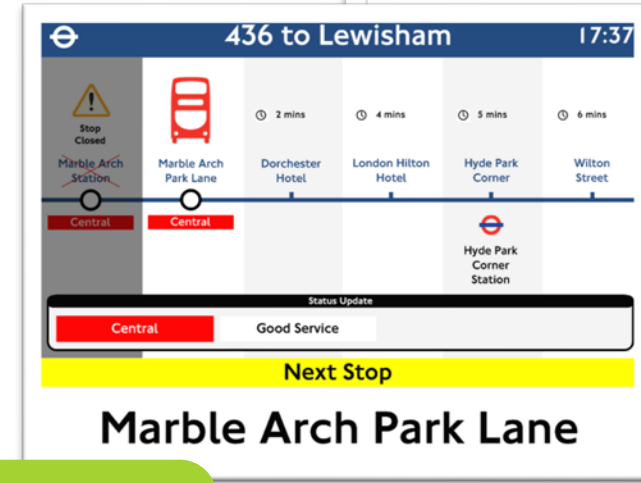
It's good to be informed that the next stop is closed - I like how the bar turns black to show that

It's reassuring to know the Tube is working well - it provides you with that extra reassurance

What would happen if the service isn't running well? What would that look like?

Journey Route Overview

WHAT'S WORKING WELL …

- Most customers appreciated having an overview of the bus route
- The indication of current position on route felt intuitive and easy to understand
- Space given to 'this stop' at the bottom of the screen felt appropriate

WATCH OUTS …

- Some confusion as to what the route overview labels were indicating (landmark, local high streets, Tube stops?)
- Some confusion around why the bus stop information and route information did not correspond
- Raised questions as to why the whole route could not be detailed
- Some confusion around what the red rectangle represents
 - Is this where we are now?

I think this is really great to have when you're somewhere you've never been before. The bus can be quite confusing and I never really know where I am

When I first looked at this, I thought it was telling me tube information- I find it a bit confusing and not helpful

I think it's slightly redundant to have a route overview when you can already see the stops
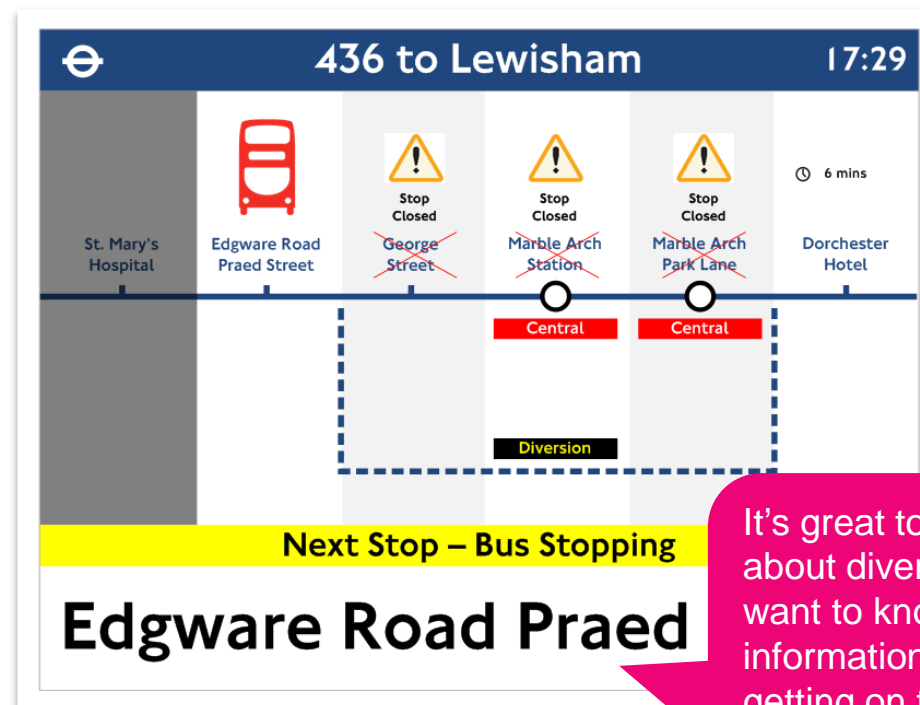
Bus Diversions
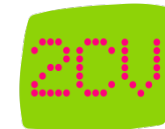
WHAT'S WORKING WELL …

- Customers appreciated being informed about diversions
- Easy to understand how many stops were closed and where the diversion ended

WATCH OUTS …

- Important that customers are also informed of this at bus stops **before** boarding the bus
- Information did not provide sufficient amount of detail
  - Customers wanted to know **where** they were being diverted to and **how long** the diversion would take
  - Customers wanted more visual information about where the diversion was taking them

436 to Lewisham 17:29

St. Mary's Hospital | Edgware Road Praed Street | George Street — Stop Closed | Marble Arch Station — Stop Closed | Marble Arch Park Lane — Stop Closed | Dorchester Hotel

Central | Central

Diversion

6 mins

Next Stop – Bus Stopping
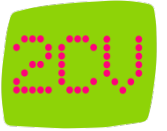
Edgware Road Praed

It's great to be told about diversions but I want to know this information BEFORE getting on the bus- now it's too late!

This raises more questions for me than answers to be honest. If I don't know where the bus is being diverted to and how long it will take there isn't much point!
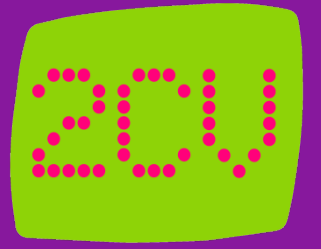
I get what they are trying to do here but it really isn't helpful - I want to know where it's being diverted to so I can get off in the right place

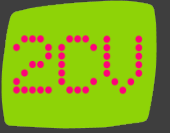# Both formats of the on bus signs were well liked by customers

- Mixed response on layout preference with both feeling intuitive

- However, some customers expected the information to scroll down the screen as the bus moves along
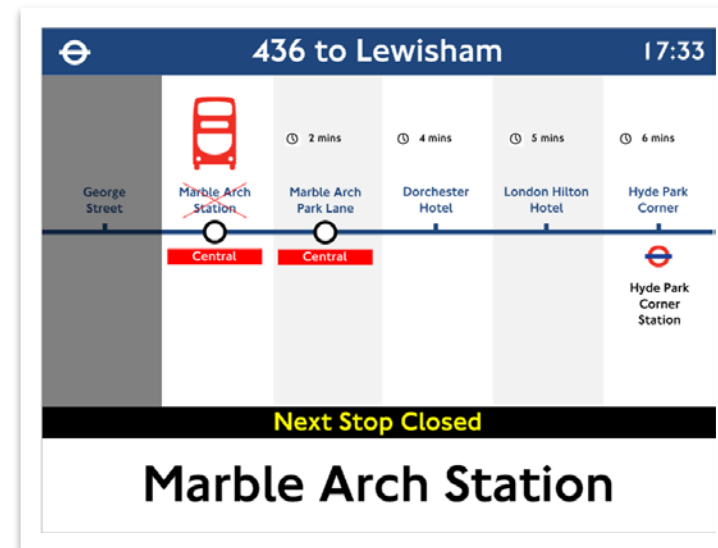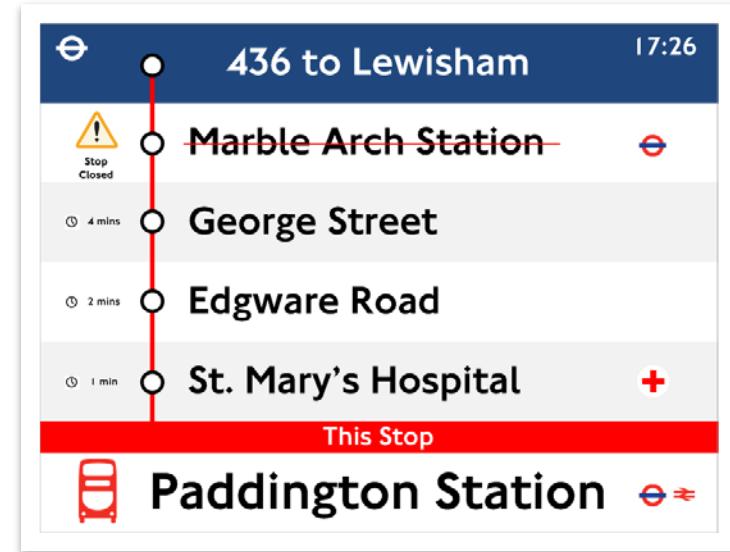
Recommendations

Recommendations

2CV

KEEP

E-paper and Digital Bus signs
- Prioritising live arrival information and estimated journey time information
- Clear and simple presentation of information
- Use of colour to denote routes / last bus departures
- Secondary information such as planned closures and disruptions (E-paper)
- Flashing / screen refresh

On bus digital displays
- Live times between bus stops
- Upcoming stop / next bus stop information
- Clear and simple presentation of information
- Graphics / dynamic nature of screen

STOP

- 3 interactive buttons on E-paper (1 or 2 is sufficient
- Detailed information of bus times on static frames (1st and last bus is sufficient)
- Too much information on the screens (bus digital screens)

START

- More real-time information on journey length

On bus digital displays
- More information on bus diversion (where and how long)
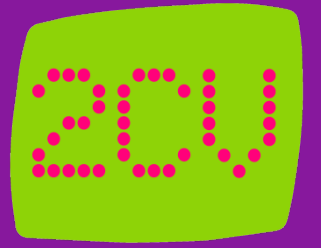
Thank you

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