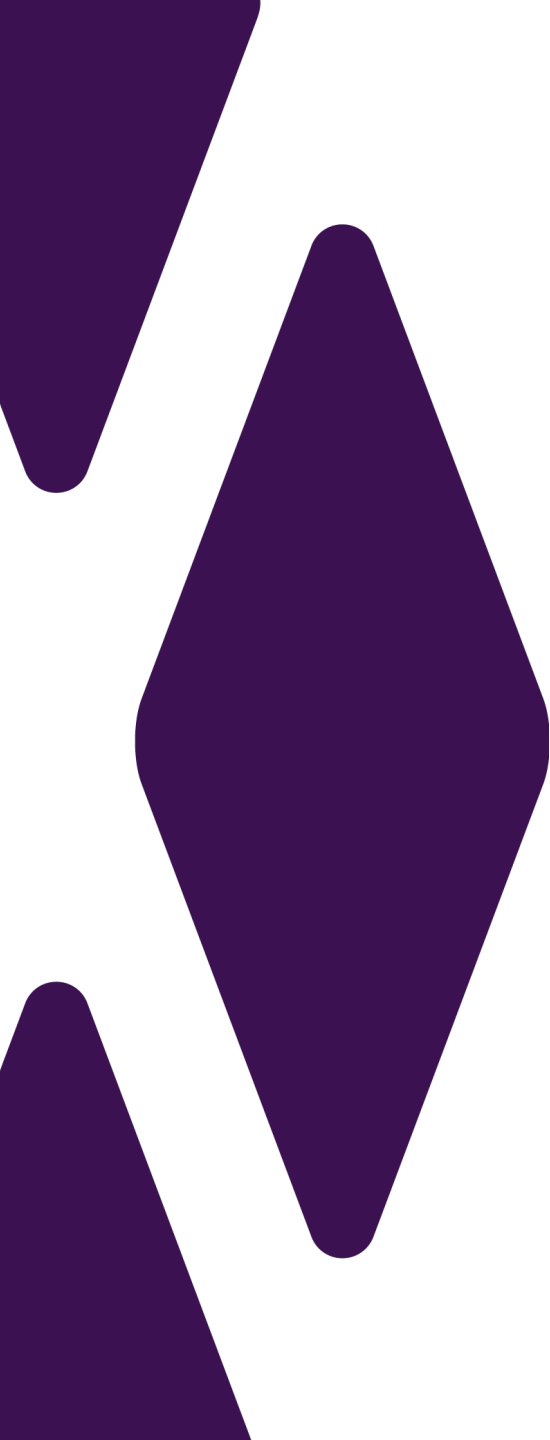




M6 Toll In Vehicle Message Signs Project

In collaboration with



Purpose of the project

- Developing innovative solutions utilising network digital infrastructure on the Midlands Motorway network which enhance the effectiveness and efficiency of traffic management.
- Evaluation of flexible messaging to target specific decision-making points on the network, improving traffic flow in real time.
- Providing a web interface for TfWM to visualise the status of the road network.
- Enabling a multi-source journey time predictor review system.
- Delivery of an auditable database to support further analysis regarding effectiveness of IVMS solutions.

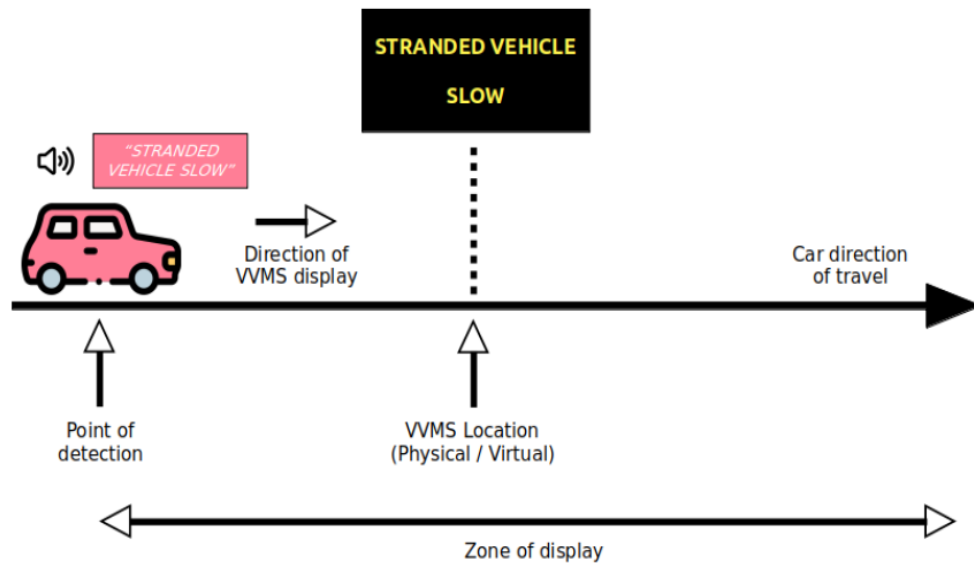
VVMS Service

Data requirements

About VVMS

- A system of geospatial information hubs providing real-time traffic alerts and instructions to moving vehicles.
- Provides the ability to send messages without the need for physical infrastructure.
- Can improve visibility and clarity to conventional road signs.
- Enables messages to be sent everywhere on the road network.
- VVMS is part of C-Roads Day One suite of services

VVMS Schematic





Benefits



**Promptly created, when not needed,
instantly removed**



**Increased visibility – delivered straight
into the vehicle**



**Audible messages to reinforce the
visible warning**



**Providing messages more clearly and
for a longer period compared to
traditional signs**



Limitations



**Requires audio-visual equipment in
vehicles**



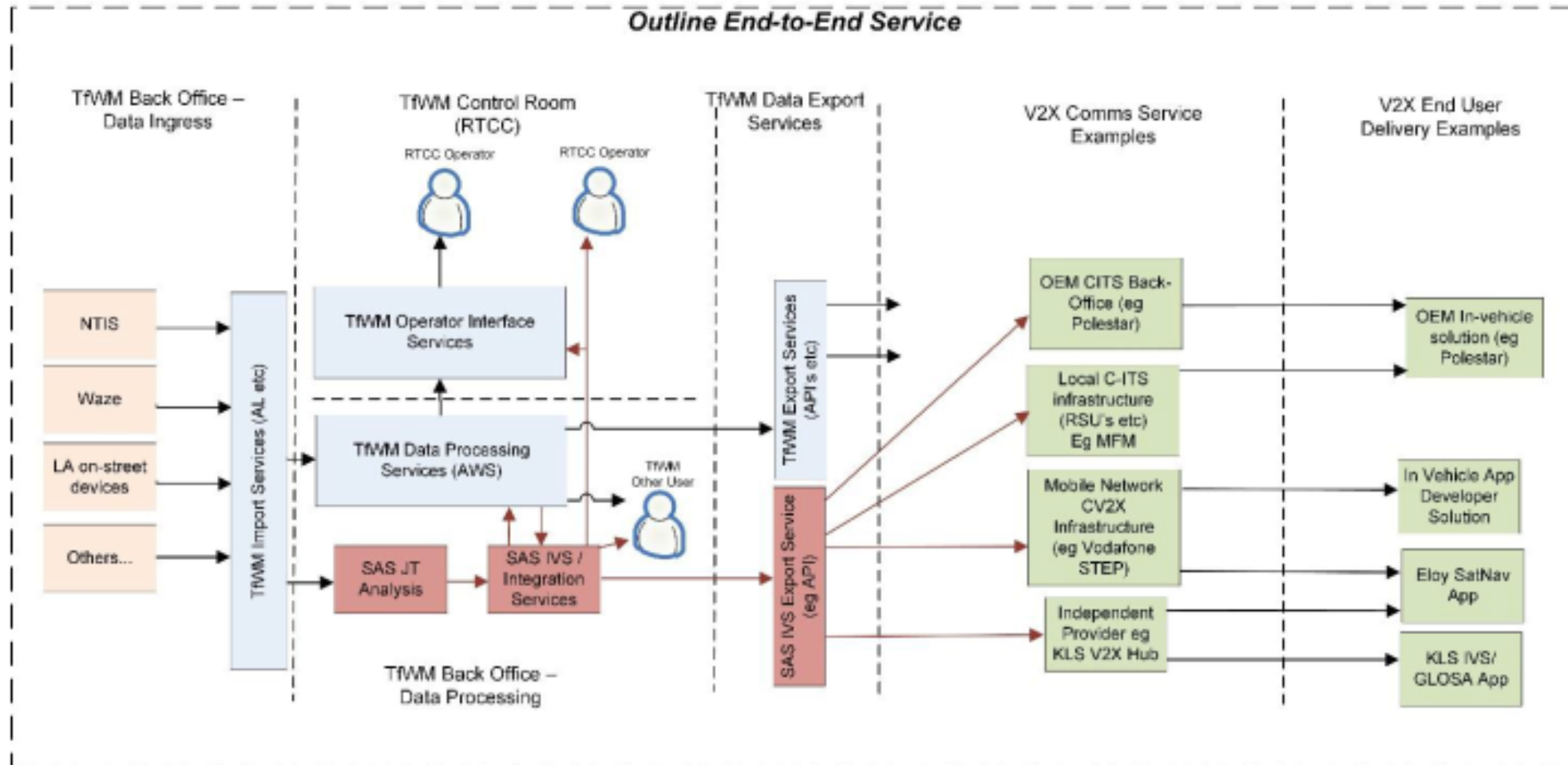
**Requires drivers to turn audio-visual
equipment on**

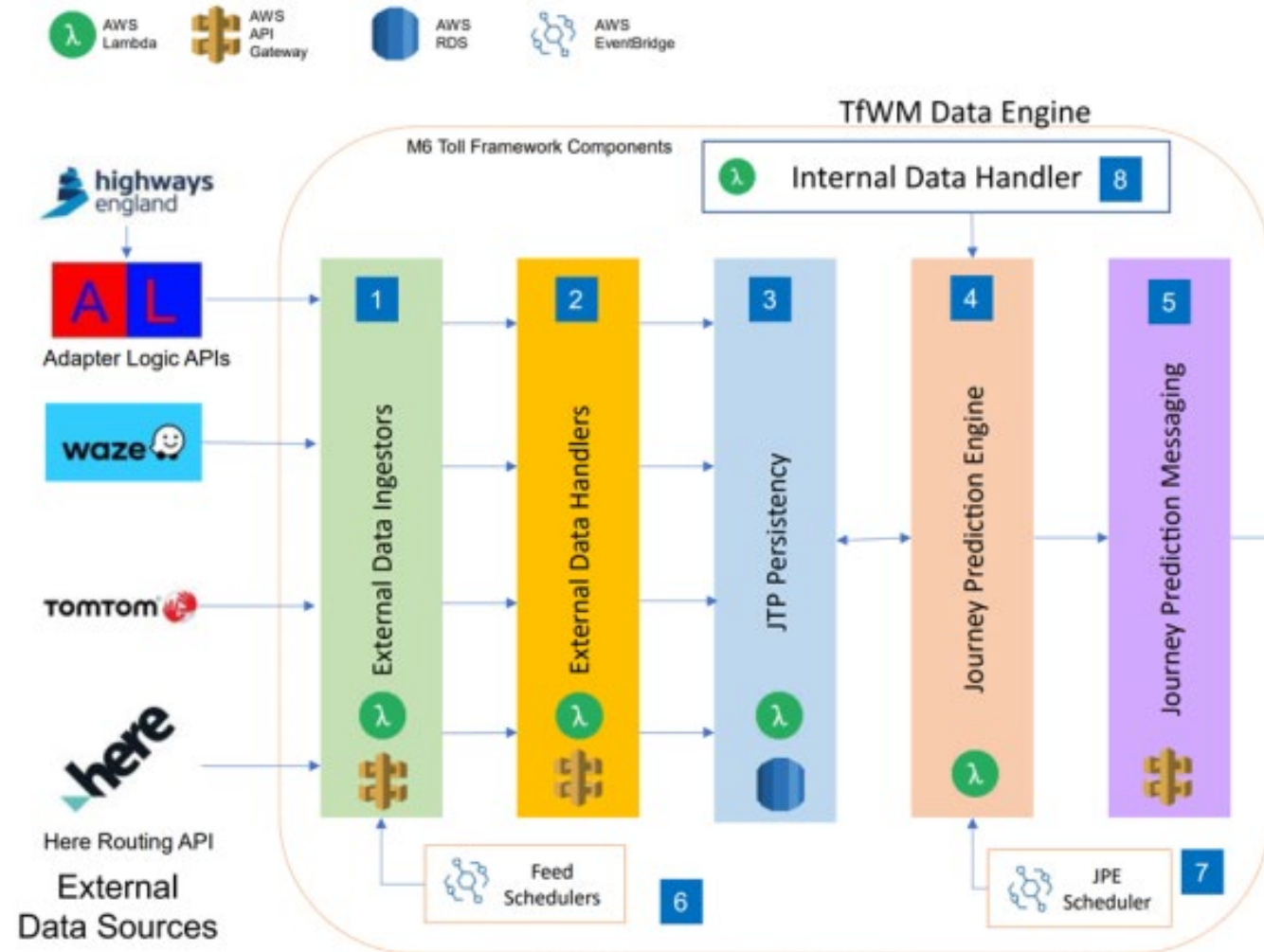


Devices must be text-to-speak enabled

End-To-End Service

End-To-End Service





System tests

Factory and Site Acceptance testing

Aim

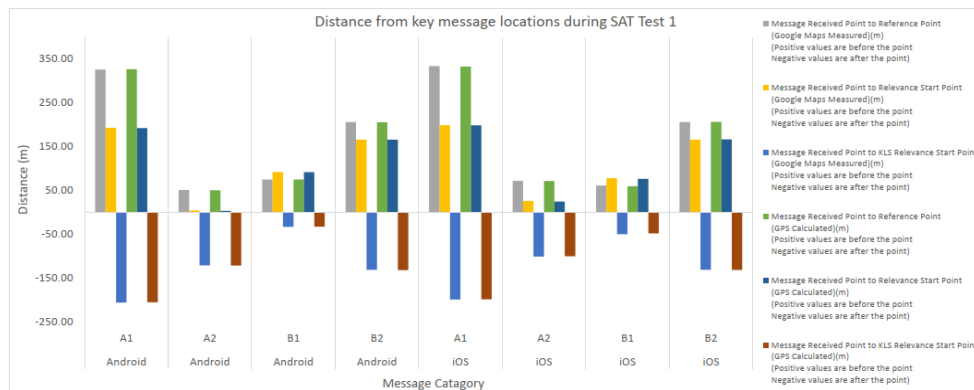
The Factory Acceptance Test (FAT) stage provided an overview and feedback on the solution against a series of criteria, ensuring readiness for the Site Acceptance Test (SAT).

FAT test comprised of 27 test cases, each tracked and governed through to sign off. 3 scenarios were tested, with 3 specific additional tests checking deployment latency, validity of dynamic data inputs and rules-based messages.

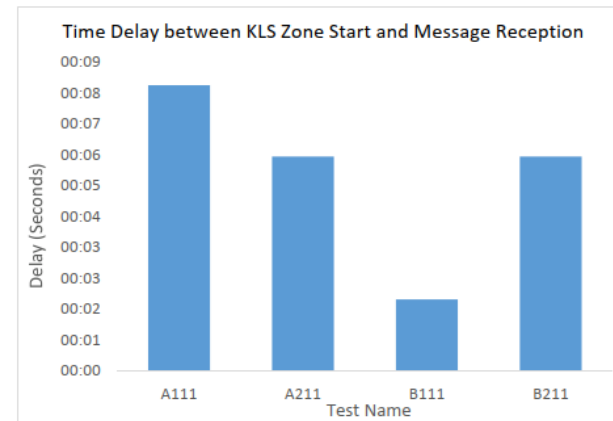
Ongoing developer resolutions were provided when minor faults were identified during the process.

Test Day highlights

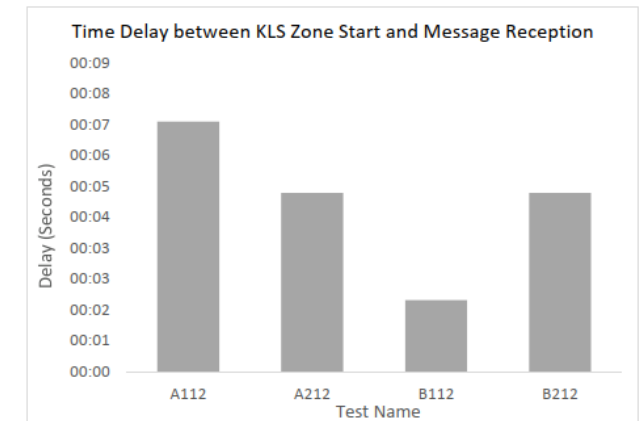
- Weather was clear, traffic was light to moderate.
- Temporary speed restrictions in place due to roadworks.
- Test devices – Apple iPhone7 (iOS 15.5) and Samsung Galaxy S20 (Android 11).
- Tests were recorded using in car video



Graph 1- Distance of Android and iOS message delivery from test point with the test device mounted in a cradle (SAT Test 1)

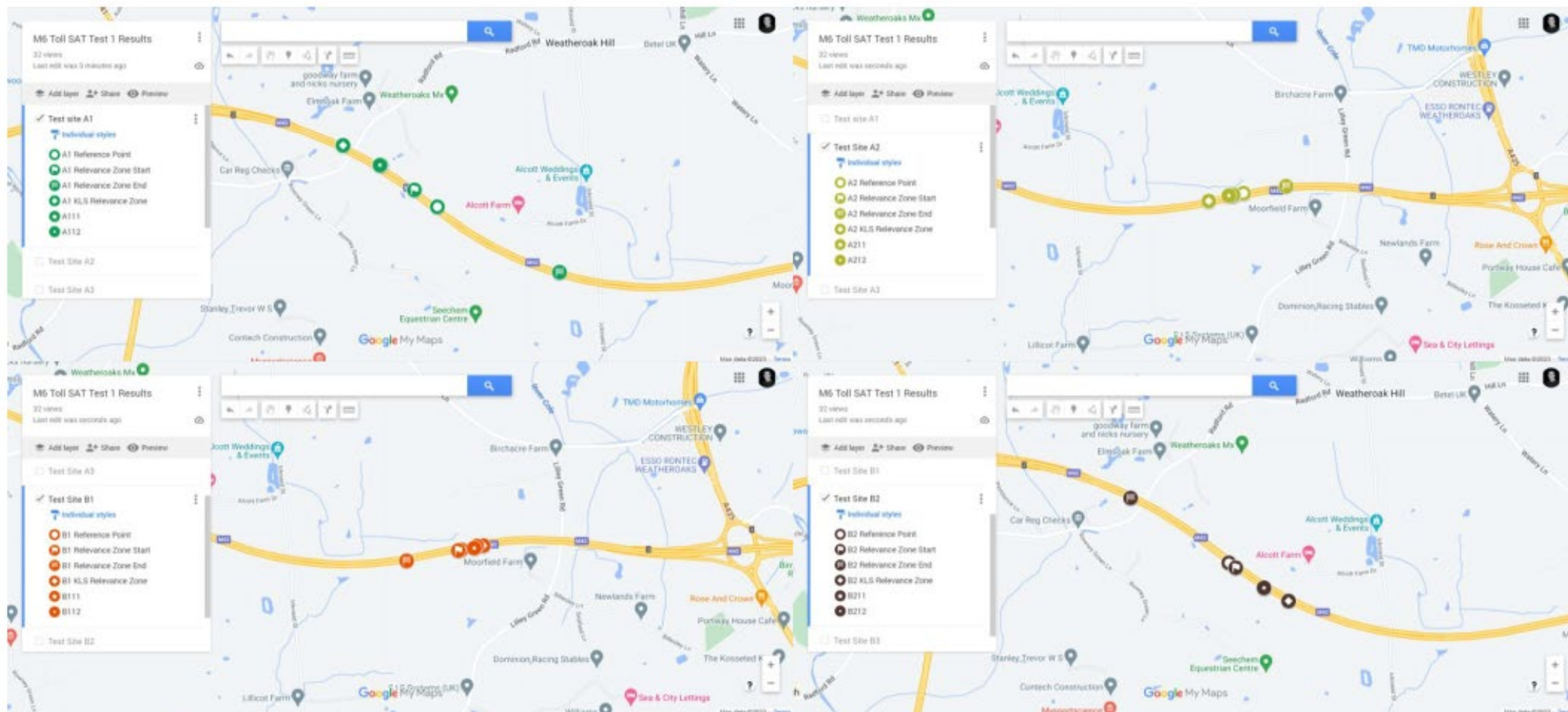


Graph 2 - Time delay in seconds between the KL Systems relevance zone start and message display point for an active app on an Android device.



Graph 3 - Time delay in seconds between the KL Systems relevance zone start and message display point for an active app on an iOS device.

Outcome: SAT tests passed to acceptable level

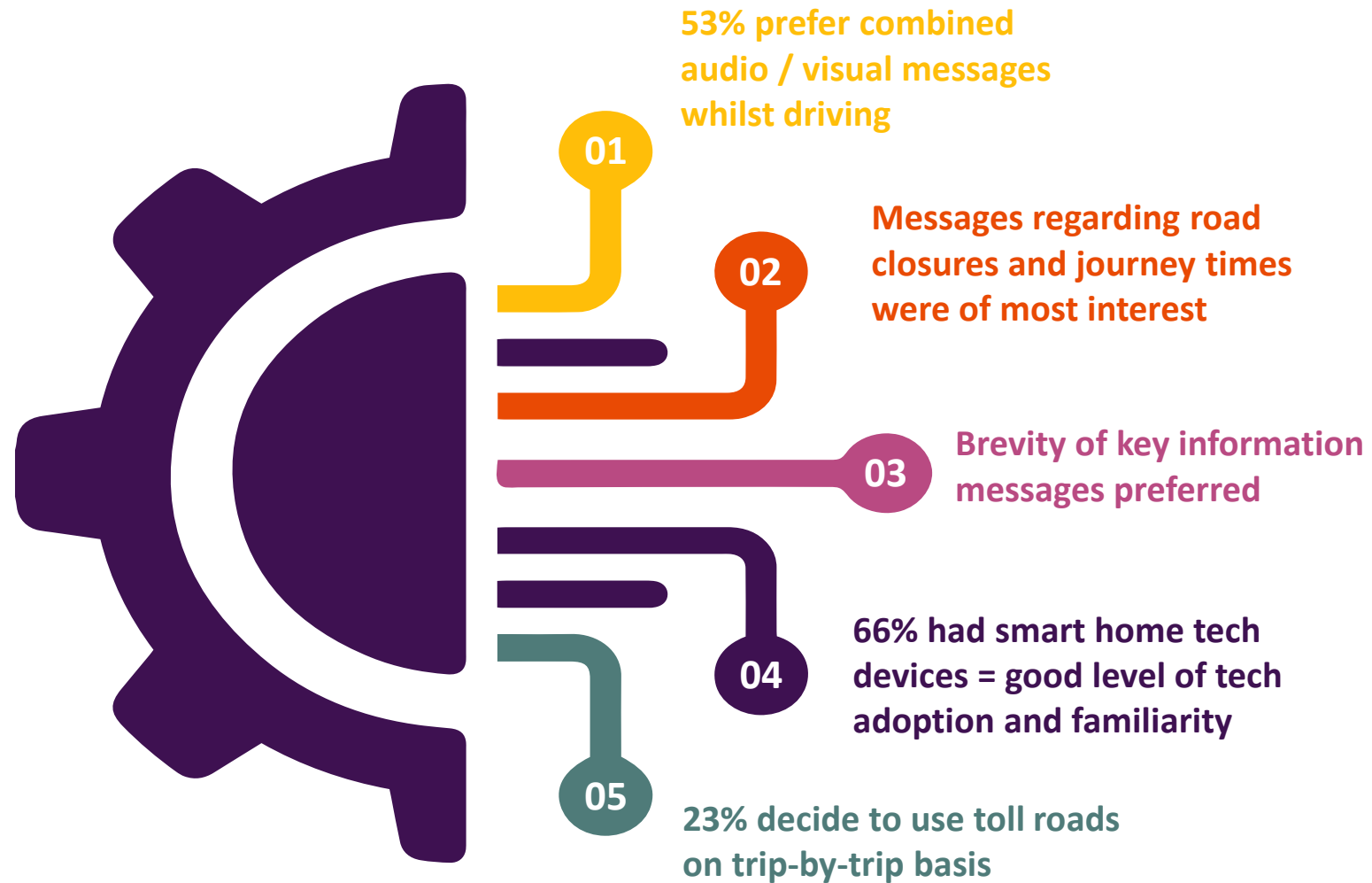


Road user insight

Insight Survey

- 1003 road users surveyed between April and June 2023
- All held full driving licences
- All drove for more than 1 hour per week
- 68% drove for 1 to 6 hours per week
- 97% mostly used cars
- 38% had held licence between 10-24 years
- 25% of respondents had cars between 10 – 14 years old

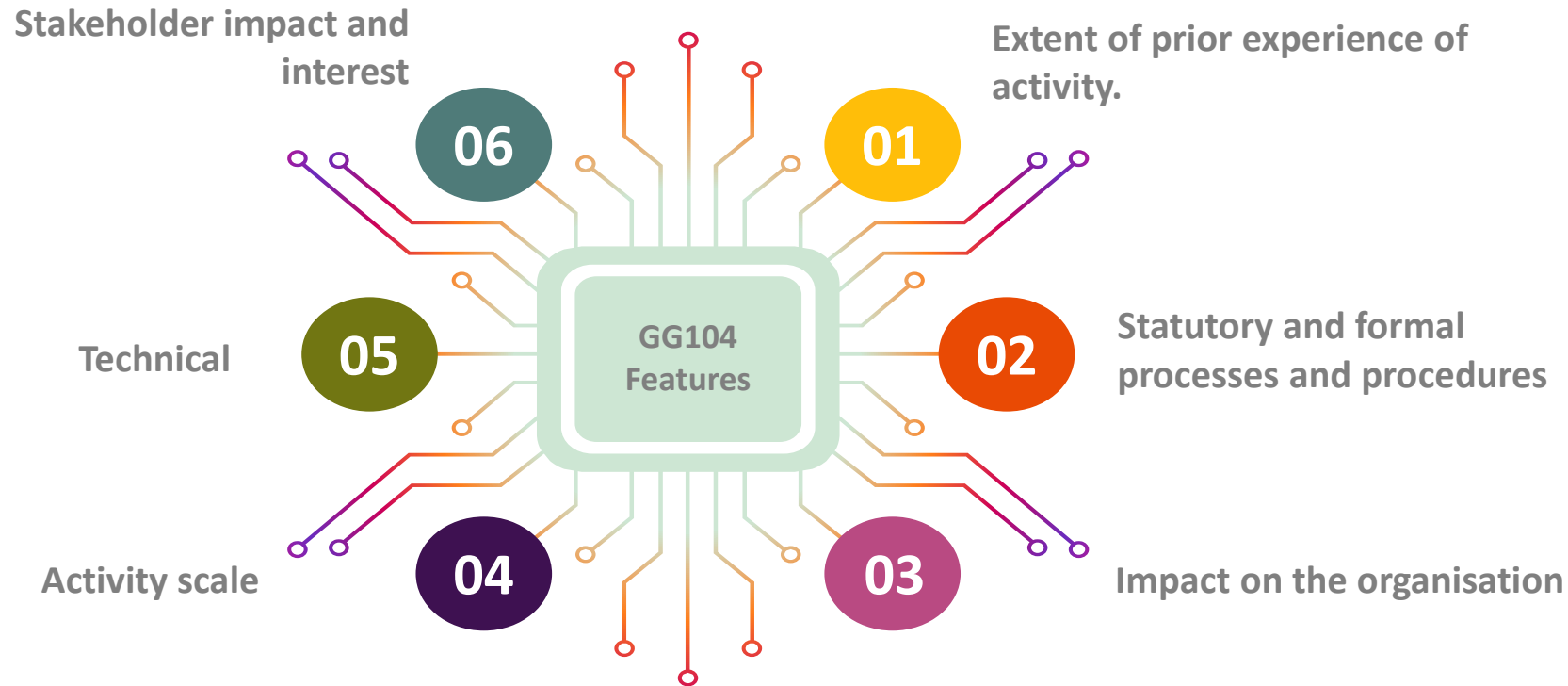
Insights



In-vehicle messaging trial

Risk assessment

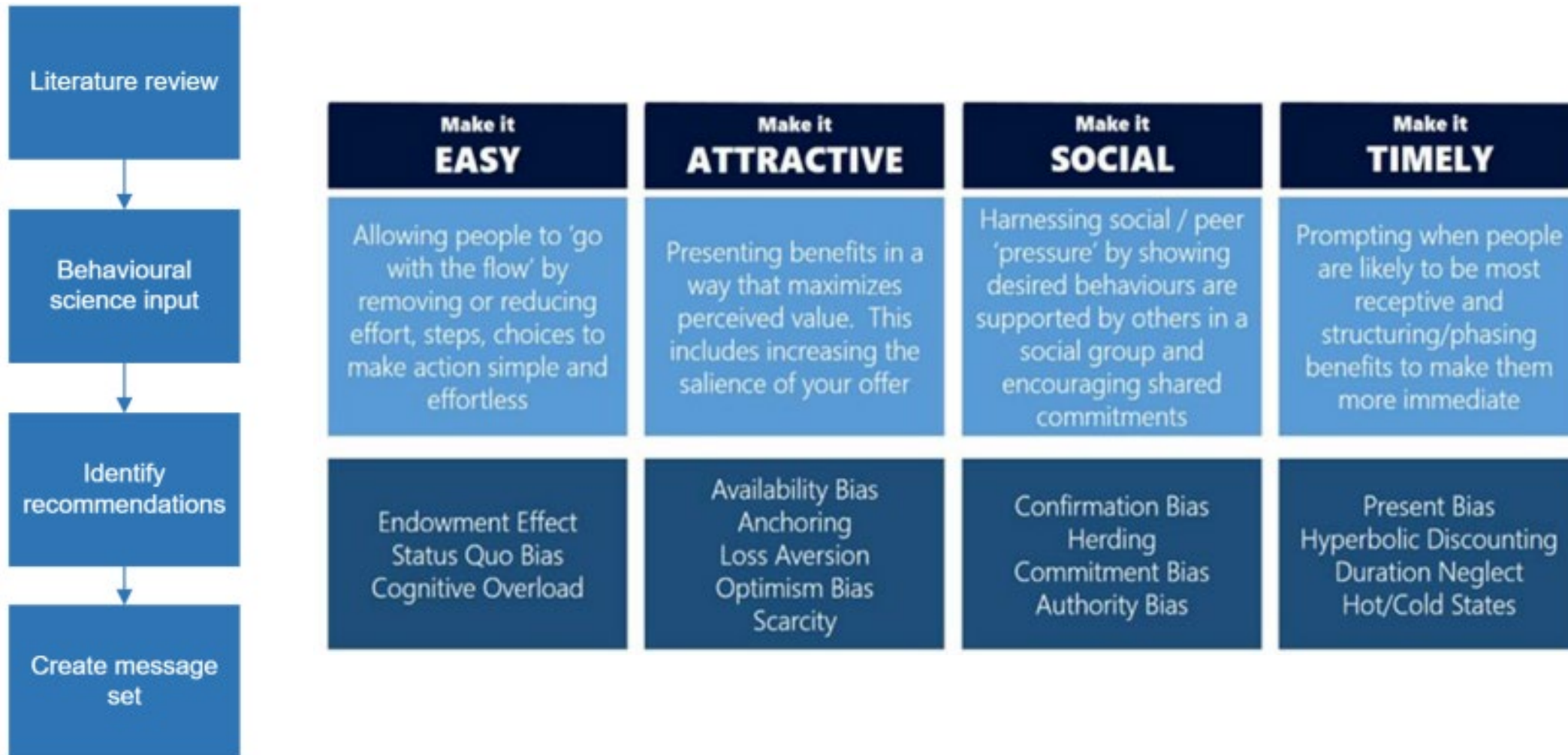
Safety risk managed using GG104 framework



In-vehicle messaging trial

Message assessment

Behaviour change & human-centred design principles were used to create messages for presentation to drivers



Message recommendations

- **Units of information:** Restrict to 4-5 pieces of info.¹⁷
- **Order:** Use location, problem, effect, guidance: e.g M6 toll accident ahead - significant congestion, take the next exit
- **Order:** Or, messages should try to communicate potential loss rather than gain (e.g. theory suggests that drivers would be more motivated by not losing 10 minutes of time than they would be about saving 10 minutes of time).
- **Customer preferences:** Include messages on journey time, roadworks, cost, diversions.
- **Terminology:** Use term crash or collision instead of accident.
- **Trust:** Include that the message is from TfWM to validate its legitimacy.
- **Types of drivers:** There may need to be subtly different messages to influence different types of drivers.
- **Social influence:** If possible, use messaging to convey that most other people are engaged in the desired behaviour and that not many are doing the unwanted behaviour.

message recommendations cont.

- **Quantity:** Only display a maximum of 2 messages between each junction
- **Location:** Messages should be presented at locations where drivers have less other stimuli (e.g. not at the same time other information is being presented) but still have sufficient time to respond and re-route.
- **Appearance:** Use lowercase letters.
- **Mechanism:** Give participants the option to turn off features.
- **Mechanism:** Limit requirement to use touch.
- **Trust:** Ensure messages do not contradict roadside information.

Qualitative and Quantitative Research Findings

Participants, results and behavioural insights

- 30-minute surveys x 24 participants
- 22 users then had the IVMS app installed
- 14 users successfully completed journey diaries
- 14 x 30-minute surveys then carried out ahead of 7 x 45-minute surveys
- Most participants consult Google Maps prior to embarking upon journeys
- Satellite Navigation also widely used by participants

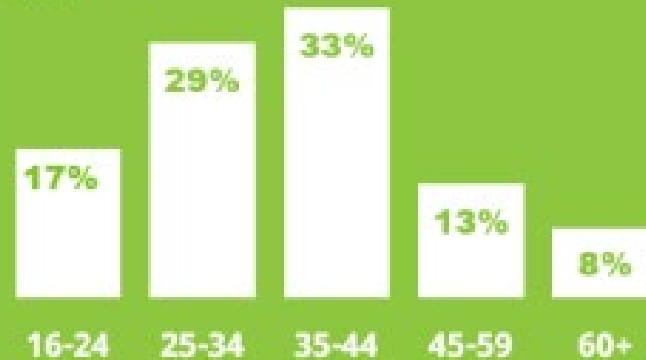
Trial demographics

24 participants
started the project

*13 via the Keep WM Moving!
online community*

11 via a recruitment partner

AGE

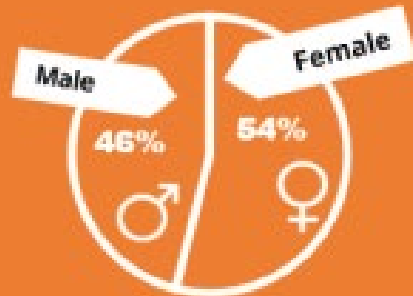


LOCATION

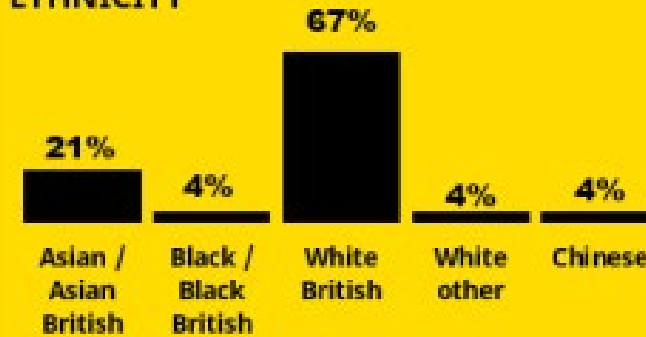
Birmingham	42%
Dudley	8%
Coventry	8%
Walsall	17%
Wolverhampton	4%
Solihull	4%
Other (E.g., Telford, Worcester)	17%



GENDER



ETHNICITY



Key takeaways

Scale of change

1 in 3 participants changed their behaviour as a result

Positive feedback

App was straightforward and user friendly

Behaviour changed

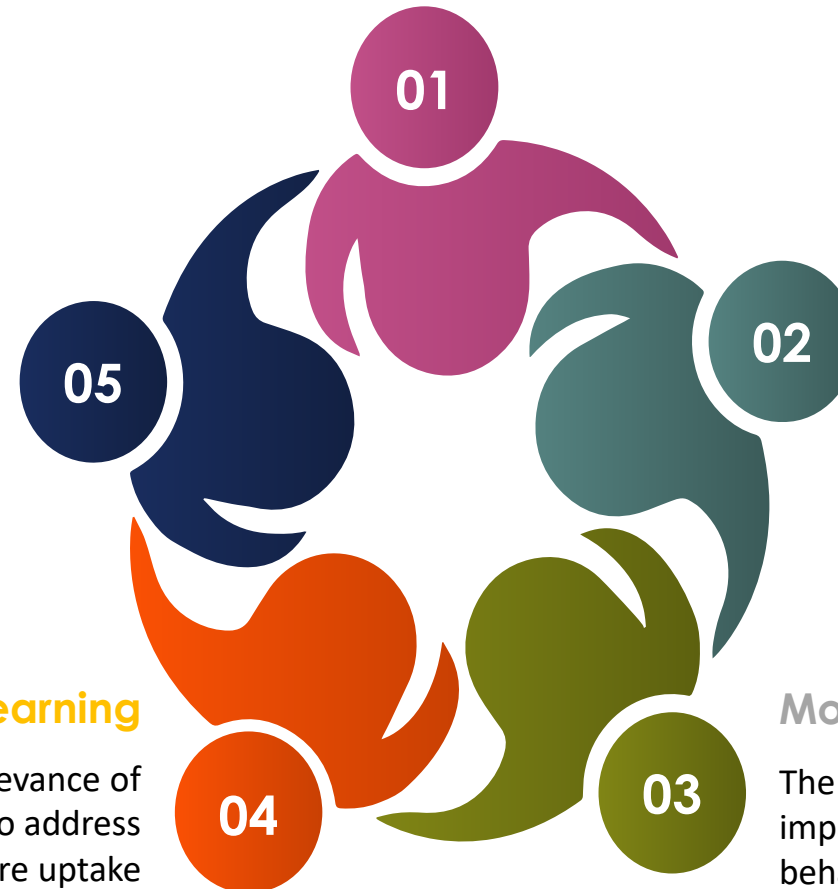
Most common behavioural change = route diversion or avoidance

Critical learning

Accuracy and relevance of messaging is crucial to address concerns and ensure uptake

Motivations to change

The greater the significance of the impact to the user = the greater behavioural change



Insight regarding additional features

Customization

Participants expressed desire for greater customization within the app.

Real-time updates

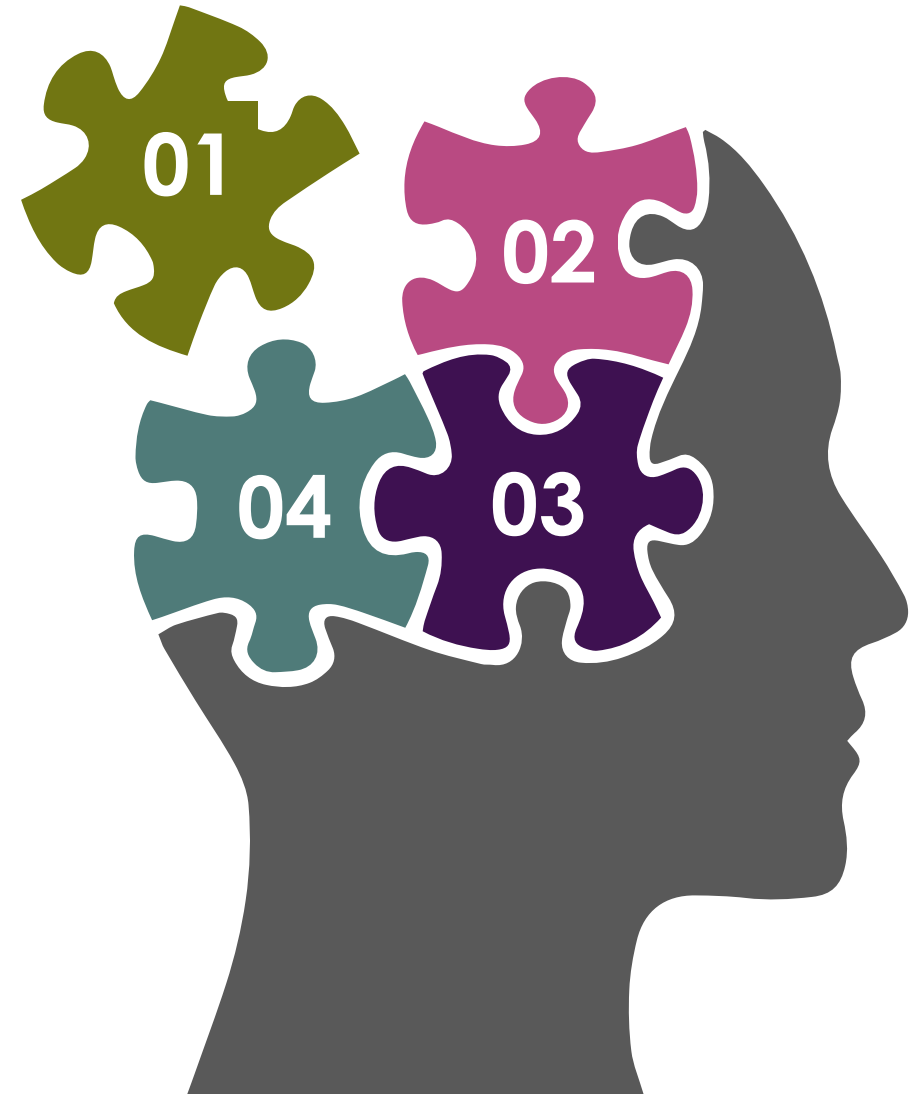
Participants sought a simple yet accessible interface with real-time updates.

Journey planner

Customizable messages and a journey planner features were of interest

Interactivity

Participants expressed the need for the app to be interactive to engage users



IVMS Trial Assessment and Future Developments

Next steps

- 16 developments identified following feedback from TfWM Teams and SAS
- Performance and usability will be further improved by modifications to address user feedback

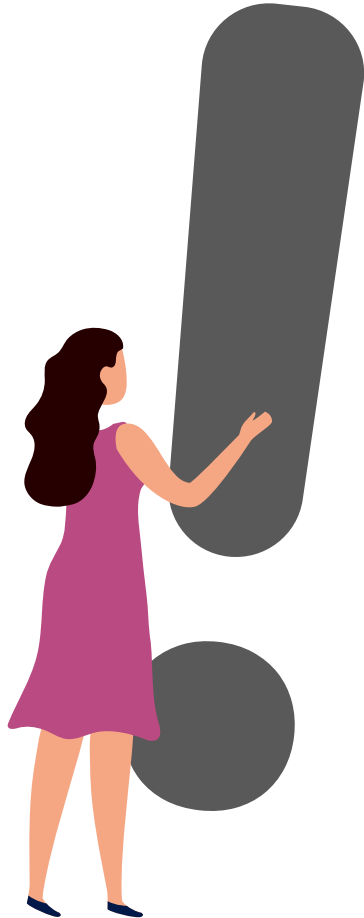




Roadmap to widescale rollout

Conclusions and questions

Thank you – any questions?



Using messages sent directly to drivers' vehicles, it informs them, targeting decision-making locations, promoting the use of the M6 Toll where necessary.

The system has received mostly excellent comments and the benefits for improving public information regarding traffic conditions has been recognised.

