INVESTIGATION INTO RELIABILITY: LONDON UNDERGROUND JUBILEE LINE

BY: JACK AGOLLI, MARIANNA BALEY, BERWIN JAYAPURNA, YIANNIS KAPAROS
Project Goal

INVESTIGATE RELIABILITY

JUBILEE LINE
Objectives

- Accessibility
- Train Punctuality
- Safety
- Stopping Accuracy

Reliability
LONDON IS GROWING BY

9 residents every hour

An effective and modern public transportation system is necessary to facilitate this rapid growth.
Of all stations in the London Underground, 26% have step-free access. London Underground's motto, Every Journey Matters, applies to all riders.
Safety in the Underground

Passenger Fatality Risk

- Train Accidents: 24%
- Other passenger accidents: 7%
- Platform edge incidents (boarding/alighting): 11%
- Platform edge incidents (not boarding/alighting): 10%
- Slips, trips, and falls: 2%
- Assault and abuse: 0%
- On-board injuries: 46%
Methods

PASSENGER SURVEYS

INTERVIEWS
- Drivers
- Duty Reliability Managers
- Senior Jubilee Line Managers

OBSERVATIONS
- Platform Train Interface
- Passenger Behavior
- Accessibility

STOPPING ACCURACY MEASUREMENTS
- Manual Measurements
- VCC
- VOBC
RESULTS
74% of passengers felt safer with PEDs. Only 15% of passengers have had bad experience with PEDs. All six drivers were in favor of PEDs and ATC because of safety benefits.
326 people were caught in the doors over an 11-year period.

72% of passengers said they were satisfied with the provision of signs, but

Both senior staff members said customers pose the biggest threat to safety.
Accessibility

67% of passengers felt that Jubilee Line is more accessible than other lines in the Underground.

46% of passengers who needed assistance said the JL was their favorite line.
Train Punctuality

30-40% of delays are a result of customer’s lack of “awareness and understanding of the system”

Total Dwell Times Comparison - No Outliers

Door Open Time - PEDs vs. Non-PED
Stopping Accuracy

Stopping accuracy is one of the most significant measurements of an Automatic Train Operation (ATO) system’s efficiency.
Stopping Accuracy

The **VCC data matched** our manual measurements in over 96% of cases.

In March of 2017, the VCC data revealed that in **over 96%** of cases in the JL the trains stop **within 20cm**.

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**Train 96081 Stopping Accuracy Data Comparison**

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RECOMMENDATIONS
TRIPLE POLE

Triple poles consist of three bars protruding from the central pole, spaced equally from one another.
PLATFORM MARKINGS

Platform markings, as visualized at Stratford station on the right, will allow more effective boarding and alighting on non-PED platforms and minimize obstructions.
METAL RAILINGS

Metal railings would be placed along the platforms in the areas between the train doors, and serve as a more cost-effective safety barrier and indicator of where the train will stop than PEDs.
CONNECTED CARS

Connected train cars, like those currently used in the train stock on the Metropolitan, Circle, District, and Hammersmith & City lines, would allow accessibility across the entire train.
MECHANICAL GAP FILLERS

Mechanical gap fillers bridge the gap at the PTI. As they are extended from the train upon stopping at stations, and prevent people from falling into or getting trapped in the PTI.
A fee is proposed for passengers who prohibit train doors from closing on time. Implementation of this could be chip based or camera based and linked to the passenger's Oyster Card.
ACCESSIBILITY CARD

An accessibility card would be available for riders with disabilities (visible or nonvisible) that require assistance to navigate around the Underground, and would notify station staff when the rider enters the station.
INVESTIGATION INTO SIGNAGE

A focused study into optimized sign design and placement is recommended based on our findings of how important influencing customer behavior is for reliability.
Moving Forward

MODERNIZATION & CUSTOMER BEHAVIOR
Joshua Rosenstock, our advisor
Adrienne Hall-Phillips, our co-advisor
Sarah Crowne, our ID 2050 professor
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Phil O’Hare, general manager on the Jubilee Line,
Steve Walling and Eric Wright, former and current sponsors for London projects with TfL
Questions?
Contact us at CPC17@wpi.edu