Last-Mile Logistics in Urban Areas

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9th International Conference on Smart Cities and Green ICT Systems (SMARTGREENS)

2–4 May 2020

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Freight Traffic Control 2050: Transforming Last-Mile Logistics
(ran from Jan 2016 to July 2019)

FTC 2050
FREIGHT TRAFFIC CONTROL

http://www.ftc2050.com

UNIVERSITY OF Southampton

Lancaster University

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UCL

TNT

TRANSPORT FOR LONDON

gnewt cargo
love the last mile

EPSRC

Last mile parcel logistics

- Final stages of delivery logistics networks

- Small van traffic growing in urban areas

- Less-than-van loads increasing with 'same-day' delivery

- Competitive industry

- Lots of small players

- Lots of inefficiencies

- Pressure to reduce emissions

- Land use planning not accounting for new e-commerce trends

# Evidence

Total number of deliveries around Oxford Street:
Carrier 1: 1st October 2016 – 7th February 2017 (129 days)
Carrier 2: 28th August 2016 – 5th November 2016 (69 days)

Evidence

Activity (days)	Number of deliveries - All 836 postcodes (Top 8 Postcodes)			
	Total	Average per postcode	Standard Deviation	Maximum
Carrier 1 (129)	14009 (2348)	16.8 (293.5)	40 (56)	379
Carrier 2 (69)	19218 (8637)	23 (197.5)	158 (140)	4041
All Deliveries	33227 (9684)	39.8 (491)	169 (163)	4041

Data Collection
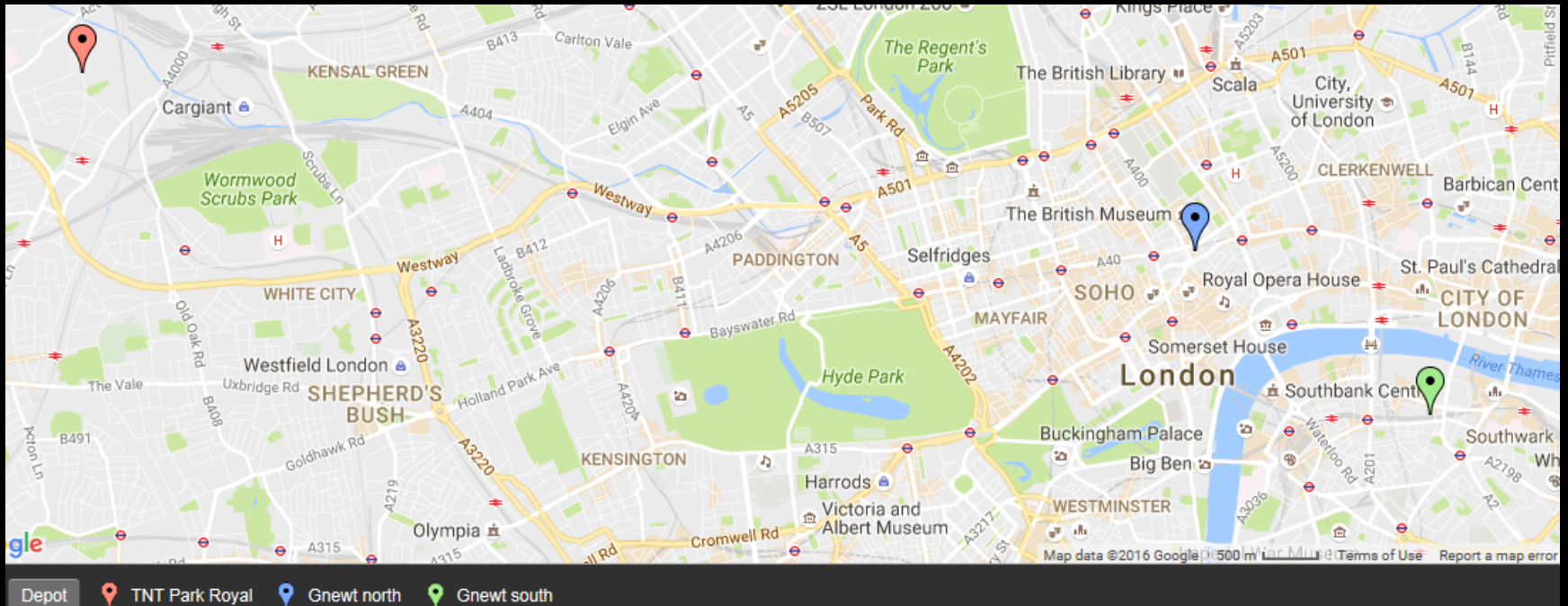
W1 – Mayfair, Soho, Oxford St., Fitzrovia, Marylebone

WC1 – British Museum, UCL, St. Pancras, Gray's Inn, High Holborn

WC2 – Covent Garden, Leicester Square, Somerset House, Charing Cross

Data collection

- Three days: Tue 25/10/16 to Thu 27/10/16

- A total of 25 rounds over the three days

- GPS tracks from driver and the vehicle:

  - RouteTracker2 App (surveyor)
  - Qstarz trackers (driver + van)

Round distance:
14.8 kms
Round duration:
7.82 hrs
Total driving time:
1.77 hrs
Total parking time:
6.05 hrs
Average speed:
1.89 km/hr
#parking stops: 35
#items delivered:
119
Efficiency: 0.06
hr/item

25 October
2016
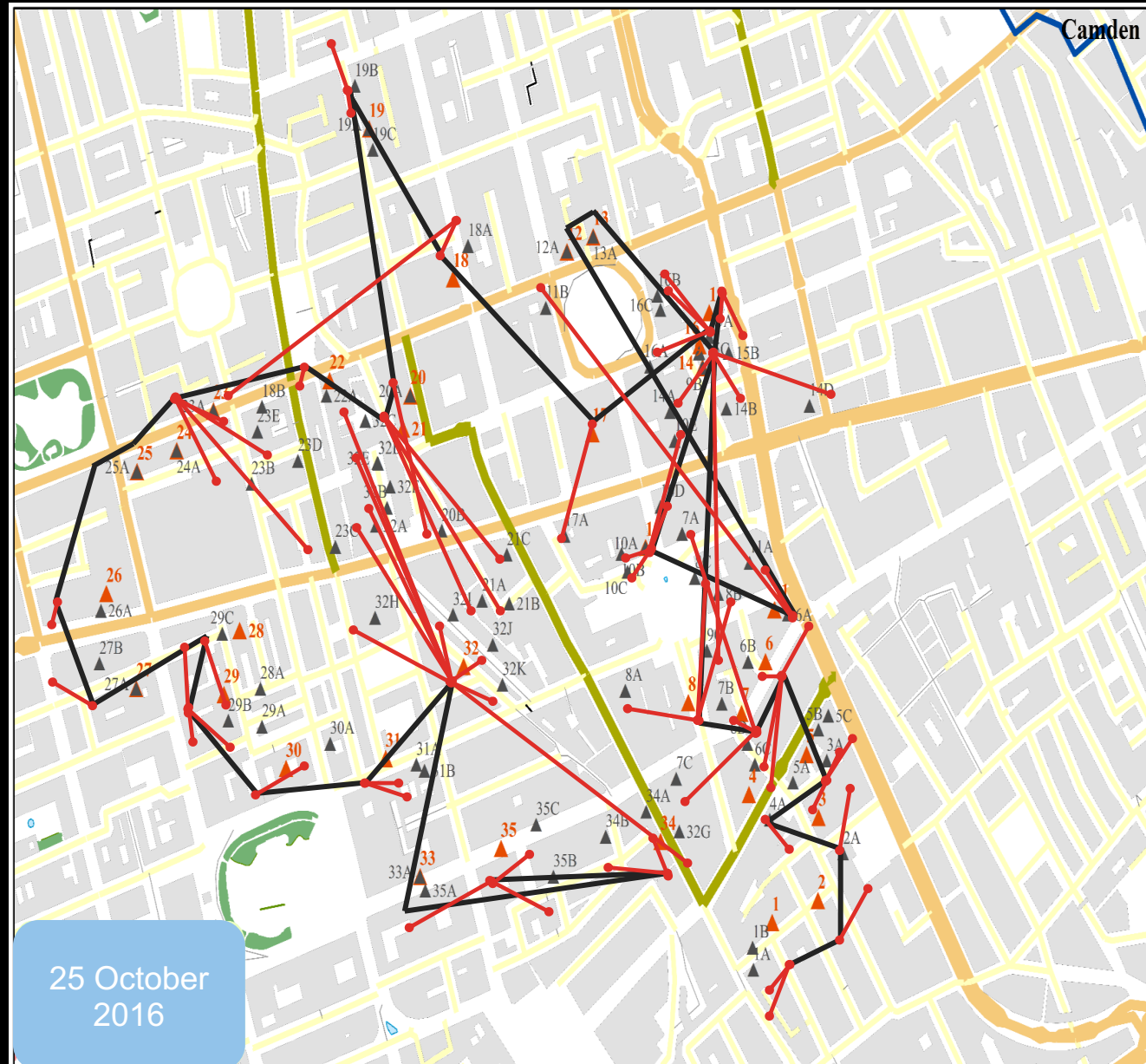
Round distance: 18.5 kms
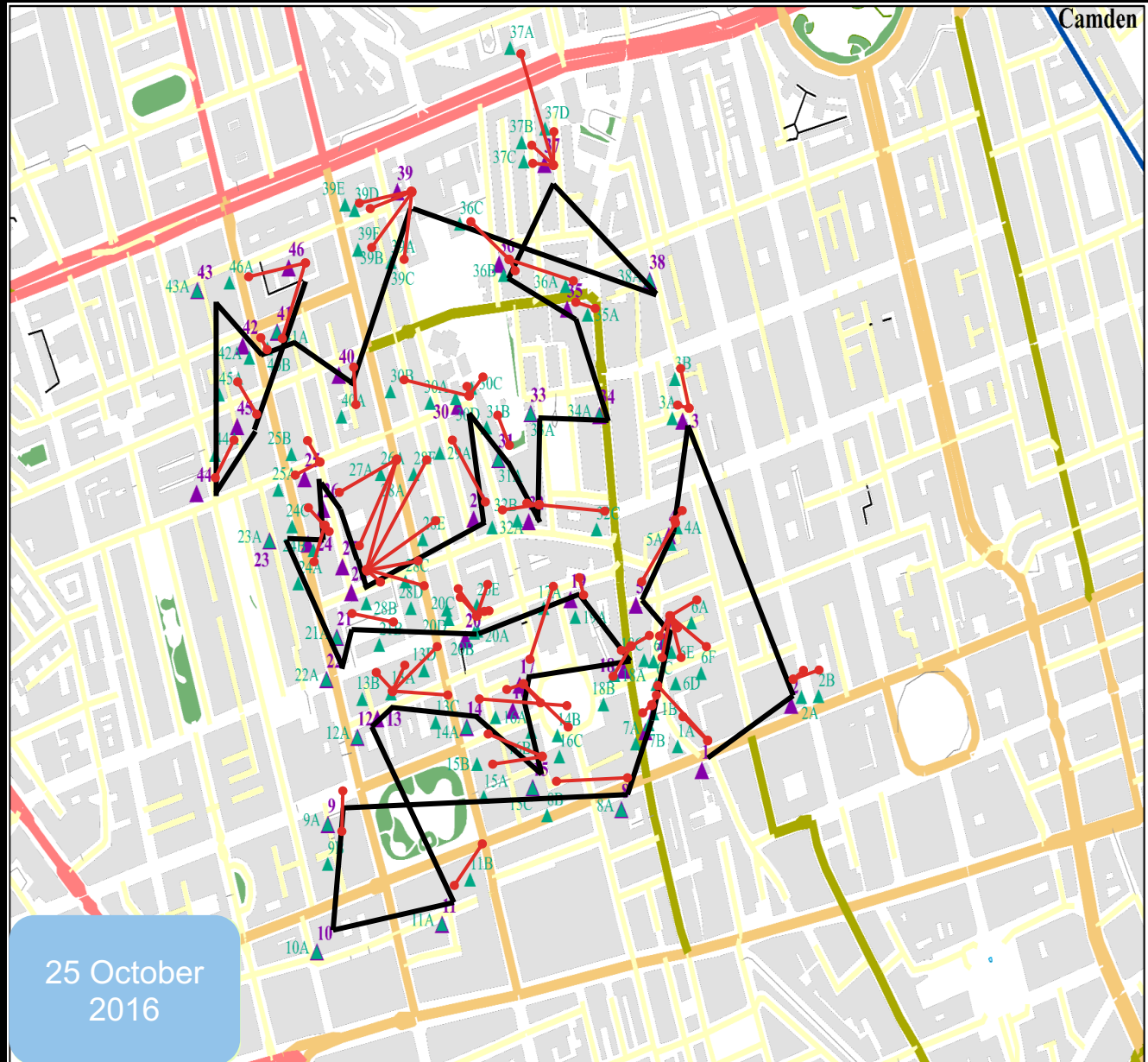Round duration: 7.3 hrs
Total driving time: 1.7 hrs
Total parking time: 5.6 hrs
Average vehicle speed: 2.53 km/hr
Number of parking stops: 46
Number of items delivered: 131
Efficiency: 0.05 hr/item

25 October 2016

Time sensitivity?

Data from a major carrier (4–9 June 2018)

Delivery by	#	From Depot 1	#	From Depot 2	#	From Depot 3
09:00	178	2.1%	25	4.9%	213	1.6%
10:00	253	3.0%	22	4.3%	296	2.3%
12:00	663	7.8%	42	8.3%	933	7.2%
18:00	7352	87.0%	417	82.4%	11584	88.9%
Total	8446	100.0%	506	100.0%	13026	100.0%

Clustered routing strategies

- **Initial modelling focuses on one driver on a given patch**

- **A two level-distribution model:**
    - Clusters of delivery points
    - Routing across the clusters

- **The routing strategy within clusters may vary**
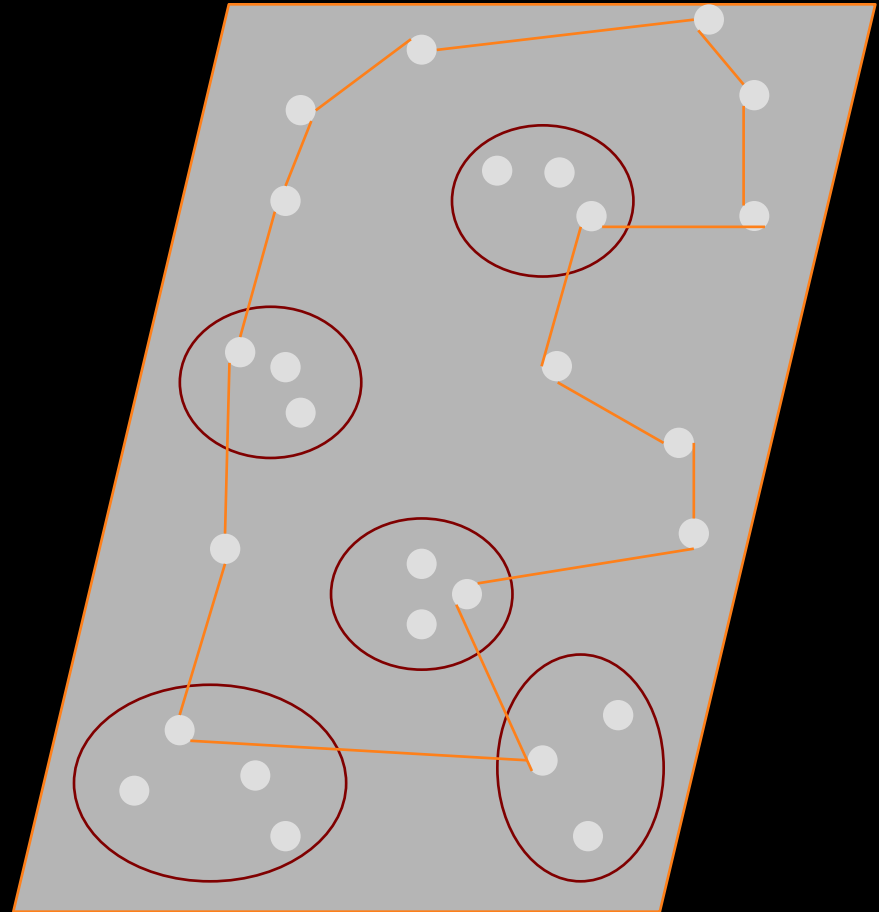
Case study
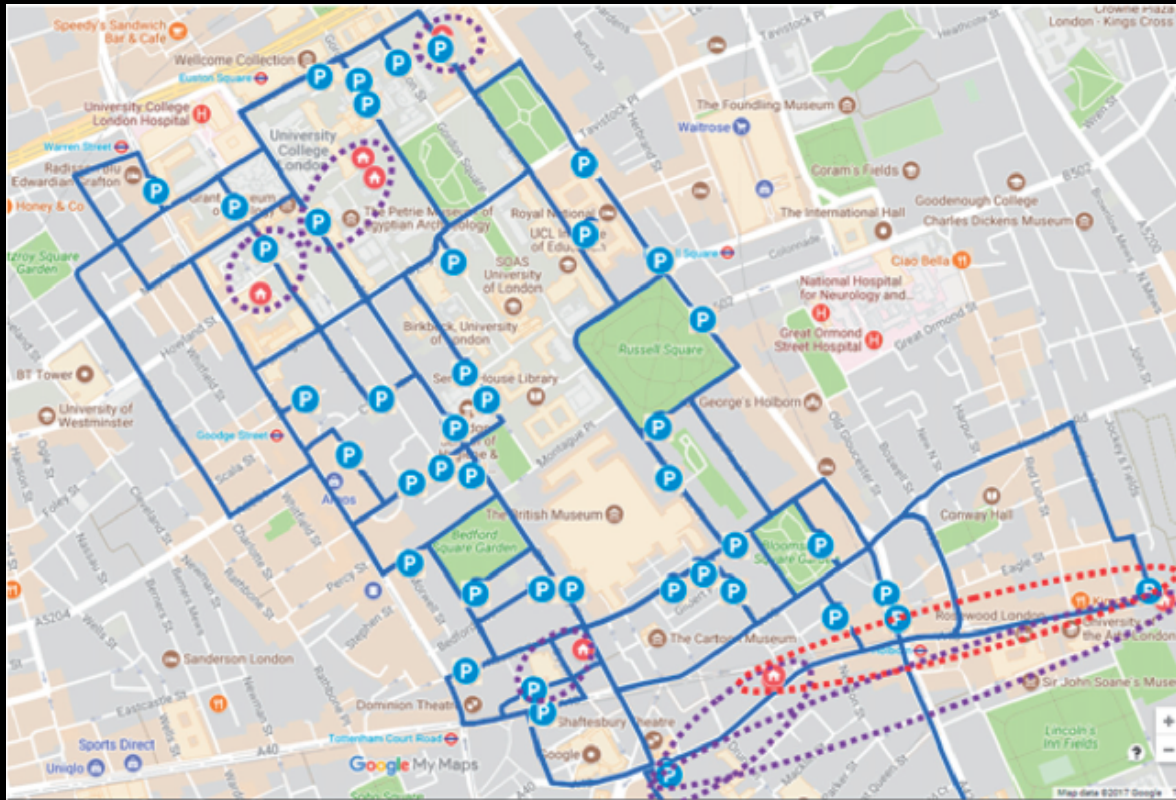
Round on 27 October 2016:

- 57 delivery locations

- Suggesting 48 clusters

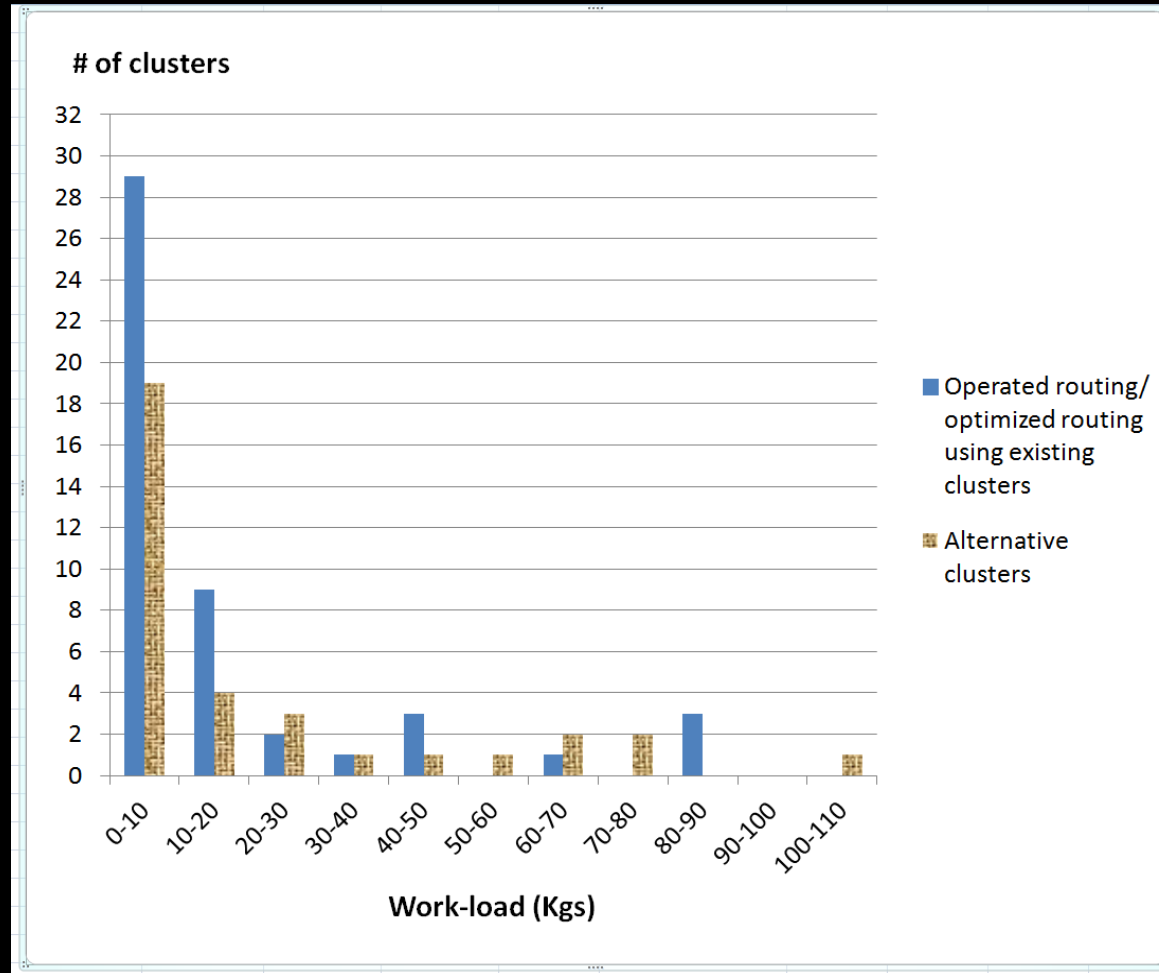- Four hours of driving and an hour of walking in total

Alternative clusters

Optimisation using 34 clusters:

- About 60% reduction in total driving time compared to original

- Parking times reduced

- Overall delivery time reduced by about 2.5 hours to original
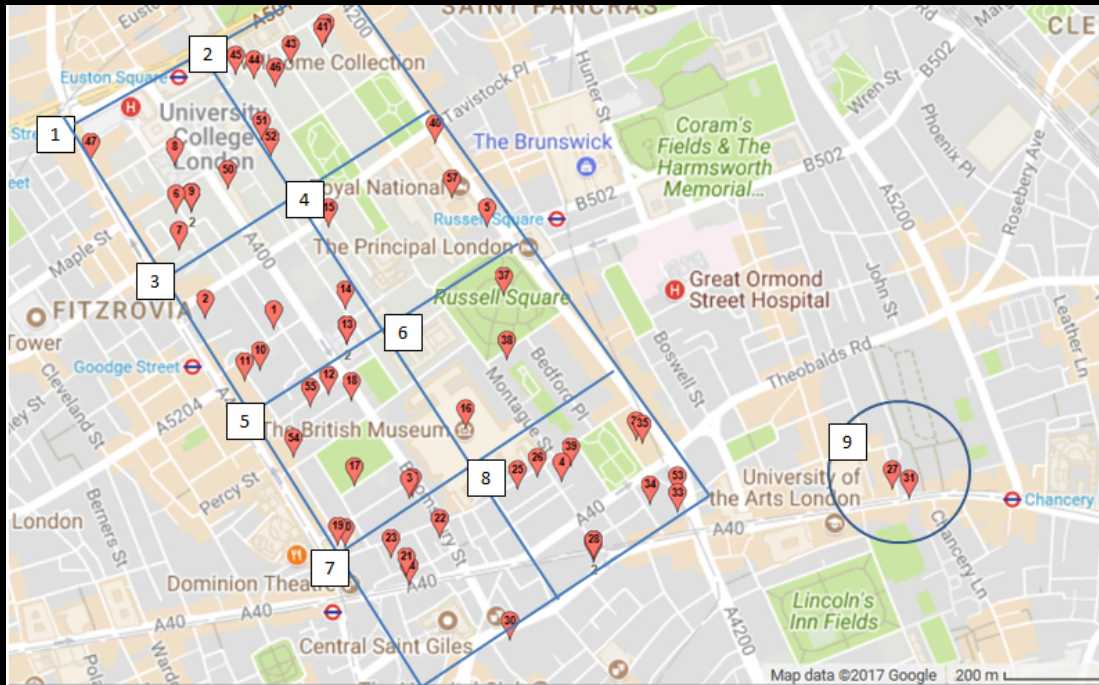
Change in workload (weight)

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Portering solutions

Portering

- Scenario 1: Drop-and-drive
    - No porter facilities required
    - Carriage provision needed
    - Synchronisation may be needed

- Scenario 2: Reception points
    - Temporary (mobile?) depots
    - Greater coverage of catchment area

Simple analysis

Scenario 1

- Van covered 16.8km over 7.3 hours

- Partition into nine approx. equal size patches

- Shortest path assumed in each patch

Simple analysis

Delivery patch (no. consignees)	Parcels	Walking time (seconds)	Walking distance (m (yards))	Handover Time for driver to porter (seconds)	Collections (no. consignors)
1 (6)	54	602	849 (928)	586	0
2 (8)	10	527	741 (810)	133	0
3 (6)	15	559	790 (864)	185	0
4 (4)	4	475	662 (724)	71	3
5 (9)	15	792	1107 (1211)	185	2
6 (3)	6	445	627 (686)	92	0
7 (5)	13	458	647 (708)	164	0
8 (9)	11	565	791 (865)	143	1
9 (2)	3	31	44 (48)	61	0
Total (52)	131	4454	6.26km (3.89 miles)	1620	6

Potential benefits:

- Reduction of 14.6km in distance (86%)

- Reduction of about six hours (5.3h + 1h – 20min)

- But…

Optimisation challenges

- Clusters
    - Fixed vs unknown
    - Capacity limitations (two-dimensional)

- Porter routes
    - Open vs closed
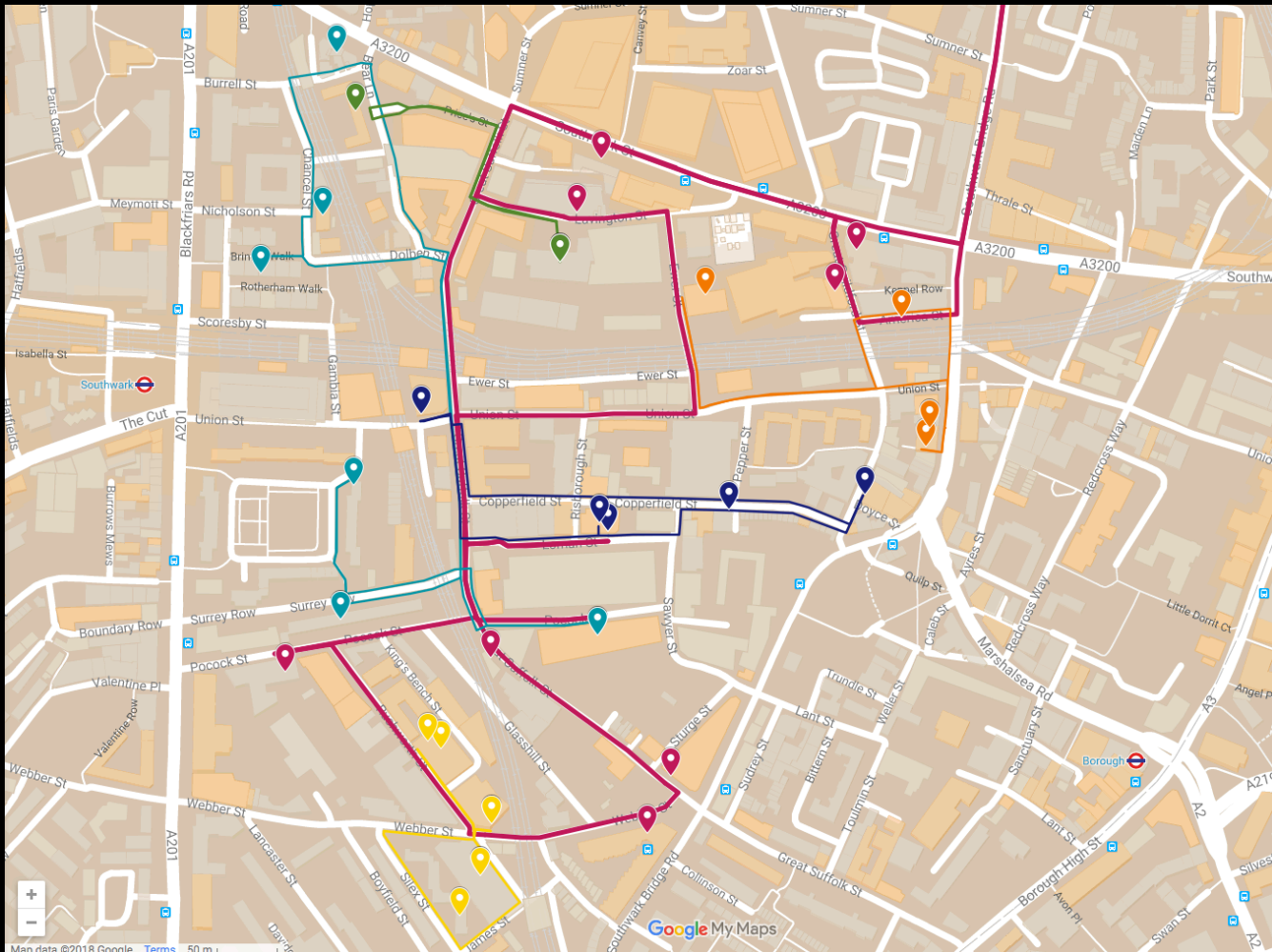   - Rendezvous points
    - Infrastructure
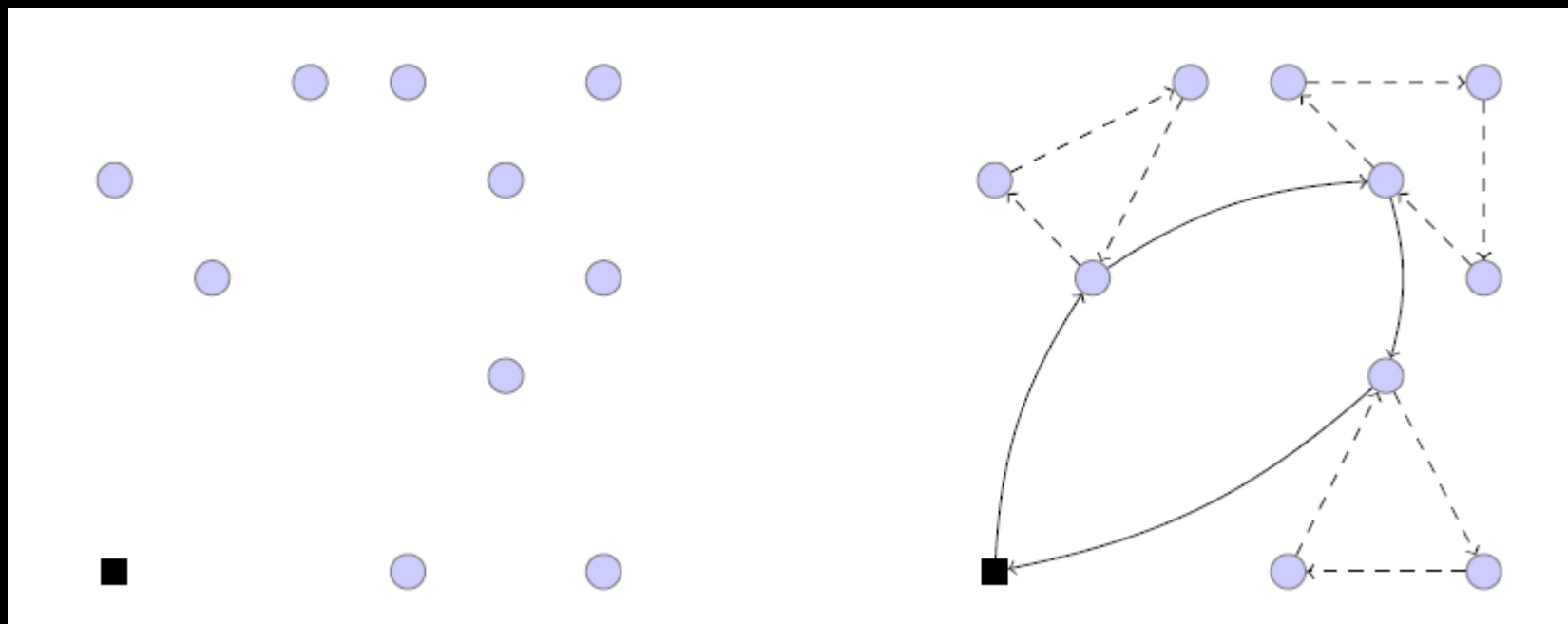
Portering solution

Portering solution

Working with Transport for London and with several universities as part of the FTC2050 research project, **Gnewt** has been trailing urban portering services to measure the impact of this new approach as a model for reducing the number of vans needed to fulfil deliveries and cut emissions. ***

https://www.gnewt.co.uk/news/ford-partners-with-delivery-company-gnewt-by-menzies-distribution-to-trial-new-digital-parcel-courier-service-designed-to-help-reduce-congestion-and-offer-faster-deliveries#

Issues in portering systems

- Geographical Coverage

- Location and Type of Portering Infrastructure

- Financing and Operating the Portering Service

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Inspiring Spirited Challenging Ambitious

Thank you!

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Thanks to my co-authors within the FTC2050 consortium.