Incorporating customer behaviour into optimisation of van deliveries

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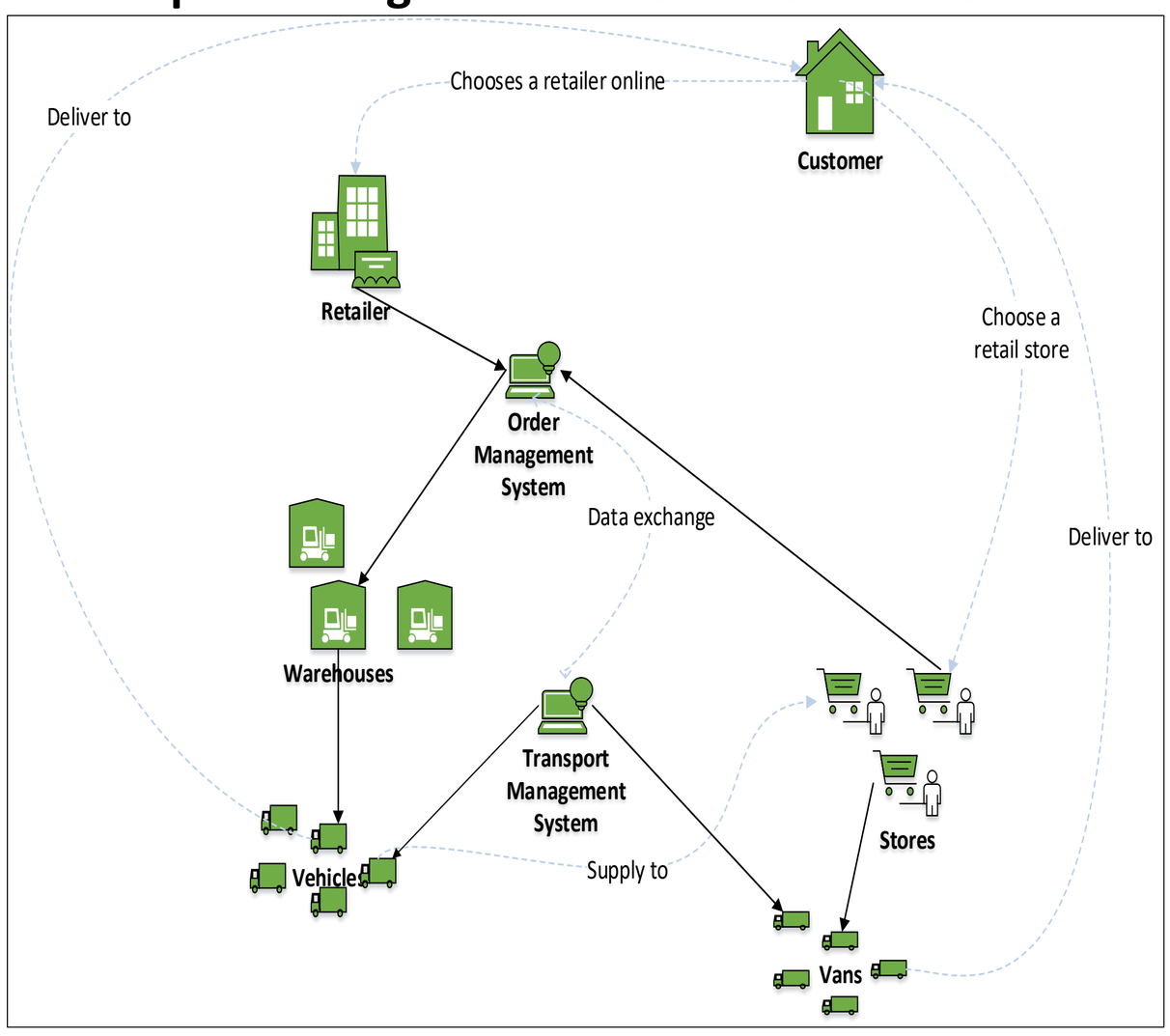
Objectives

- Incorporate consumer behaviour, attitudes and preferences in agents
- Develop an agent-based model framework for urban deliveries
- Simulate urban delivery model and calibrate with existing operation for Cambridge
- Run experiments to reduce carbon emissions from urban deliveries

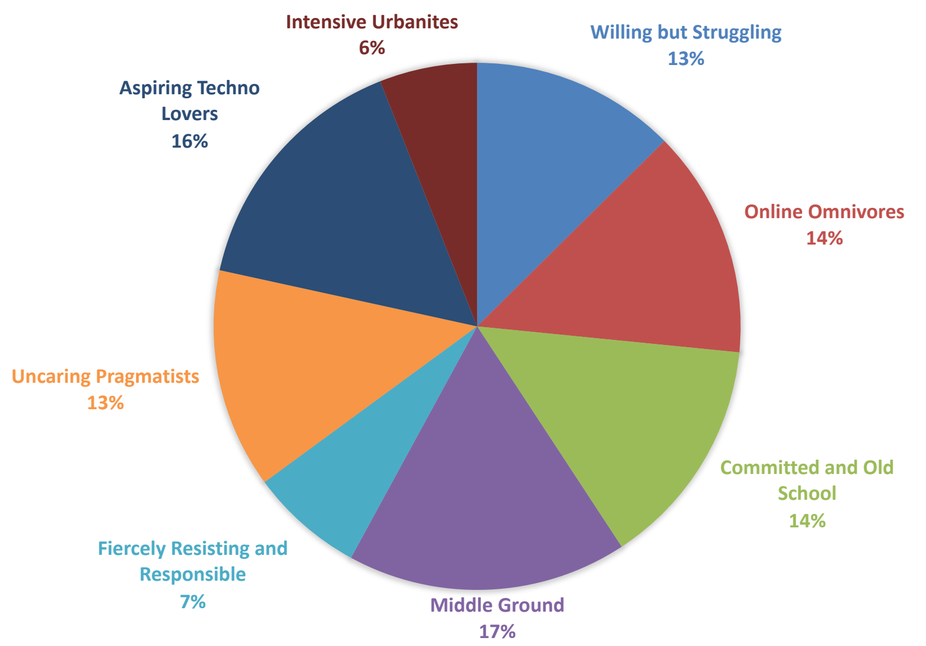
Approach – what we were doing

- Analysed Oxford consumer survey data to incorporate behaviour in agents
- Developed an ABM conceptual framework for urban deliveries
- Simulated 46,000 customer agents located in Cambridge and validated their orders
- Design of experiments for electric vans, increased capacity of vans and collaboration among Retailers

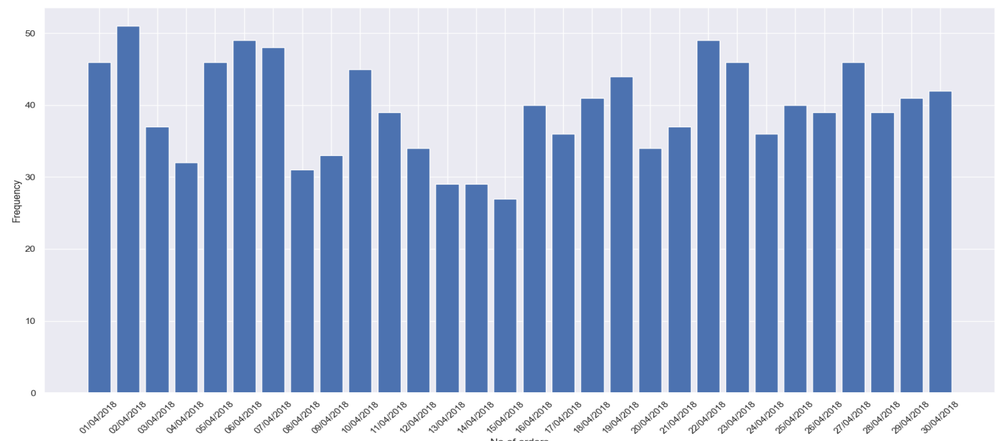
Conceptual design of ABM for urban deliveries



Customer segmentation study



Eight clusters defined by the Customer segmentation study



Number of orders generated per day by Customer agent for Supermarket A

What agents are doing?

- Consumer agents are choosing their Retailers based on consumer behaviour study
- Generating order profile based on their demographics
- Retailer agent is receiving orders and an API developed by MACS (Heriot-Watt University) is managing orders and routing using meta-heuristics

What do we need?

- Data from supermarkets to validate model accurately

Next steps & outputs:

Experiment Results:

1) Increasing capacity of urban delivery vehicles
2) Use of electric vehicles instead of diesel
3) Retailers collaborating on home deliveries