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

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

Customer segmentation study

Eight clusters defined by the Customer segmentation study

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