Remote bring-site monitoring for sustainable logistics

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Internet of things context and aim
- Charity donation banks (e.g. in supermarket car parks) fitted with infrared sensors to monitor fill levels
- Online updates transmitted regularly (e.g. twice daily)
- Used by collection vehicle scheduling team to avoid visiting banks too early (inefficient transport) or too late (full banks prevent further donations and create mess)

Implementation (May-July 2013)
- 40 Oxfam clothing banks at 21 sites were equipped
- Up to 5 lorries and 1 van each day, based at Milton Keynes, serviced these banks as well as 35 other unmonitored sites and 68 Oxfam shops
- We developed a bespoke vehicle scheduling algorithm
- In a live demo over 36 working days, each day:
  - remote monitoring data were obtained and demand volume were estimated for non-monitored sites
  - algorithm was run to produce suggested routes
  - routes were implemented subject to some minor adjustments by Oxfam transport manager (e.g. to balance driver workloads)

Findings
- Distance savings over 36 days of 1159km (~5km/vehicle/day, equating to a 3.2% reduction)
- CO₂ savings of 12.89kg/day, based on emissions factors of 400g/km (lorry) and 215g/km (van)
- Average driver saved 32 minutes/day; however, manager spent 2 hours/day extra in planning

Impact
Led to commercial development of a cloud-based application, FreightVista for Charities, which manages complete lifecycle from donation to central collection: https://keyfort.co.uk/solutions/cloud/saas/freightvista/

Comments from Oxfam drivers and transport manager

<table>
<thead>
<tr>
<th>Likes</th>
<th>Dislikes</th>
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<tbody>
<tr>
<td>&quot;The new rounds gave me flexibility to schedule extra visits to shops or banks&quot;</td>
<td>&quot;The added time pressure on top of my normal job to plan and organise routes daily&quot;</td>
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<tr>
<td>&quot;I sometimes finished work an hour early&quot;</td>
<td>&quot;Sometimes I had to go out of my way to visit a bank&quot;</td>
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<tr>
<td>&quot;Nearly all banks were at least 60% full when I visited&quot;</td>
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Demonstration area
56 bank sites, 68 shops

Travel distance saved each day compared with normal operation

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