Contribution of ICT to Energy Efficiency – Local and Regional Initiatives

Case study: Optimisation of Waste Collection Routes at Daventry District Council

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Contents

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1: Synopsis of the case study

1.1   The initiative involved Daventry District Council and the six other boroughs and districts of Northamptonshire that form the Northamptonshire Waste Partnership (NWP), along with Northamptonshire County Council. Using funding from the East Midlands Centre of Excellence, NWP jointly procured route optimisation software with the objective to increase the logistical efficiency of the routes used for both the collection of domestic waste (commercial waste is collected by a private contractor) and recycling by the local authorities in Northamptonshire, thereby reducing fuel usage, carbon emissions and the costs of the services.

1.2   Through optimising the routes, Daventry District Council has been able to reduce the annual overall distance covered by the refuse vehicles by around 600 to 800 miles or 25 to 33 per cent, with a corresponding CO_2 emission reduction of 40 tonnes. In addition, yearly savings of over £200,000 have been achieved as a result of optimisation, at a time when local authorities in the UK and beyond are under increasing pressure to avoid wastage of taxpayers' money and to find innovative ways to cut spending whilst maintaining essential services.

1.3   The local authorities in NWP are now exploring other uses for the software, including optimising street cleansing and road gritting routes, in order to make the most of their purchase.

2: Background and context

About Daventry District and the local authority

2.1   The district of Daventry is located in the county of Northamptonshire in the East Midlands region of England. Daventry is a predominantly rural district with a population of around 78,900 people[i] and a population density far lower than the average for England (1.08 persons per hectare compared to 3.77 for England at the time of the last census). The main urban centre is the town of Daventry, which is the administrative centre for the district.

Figure 2-1: UK map locating Daventry District and Daventry District Council
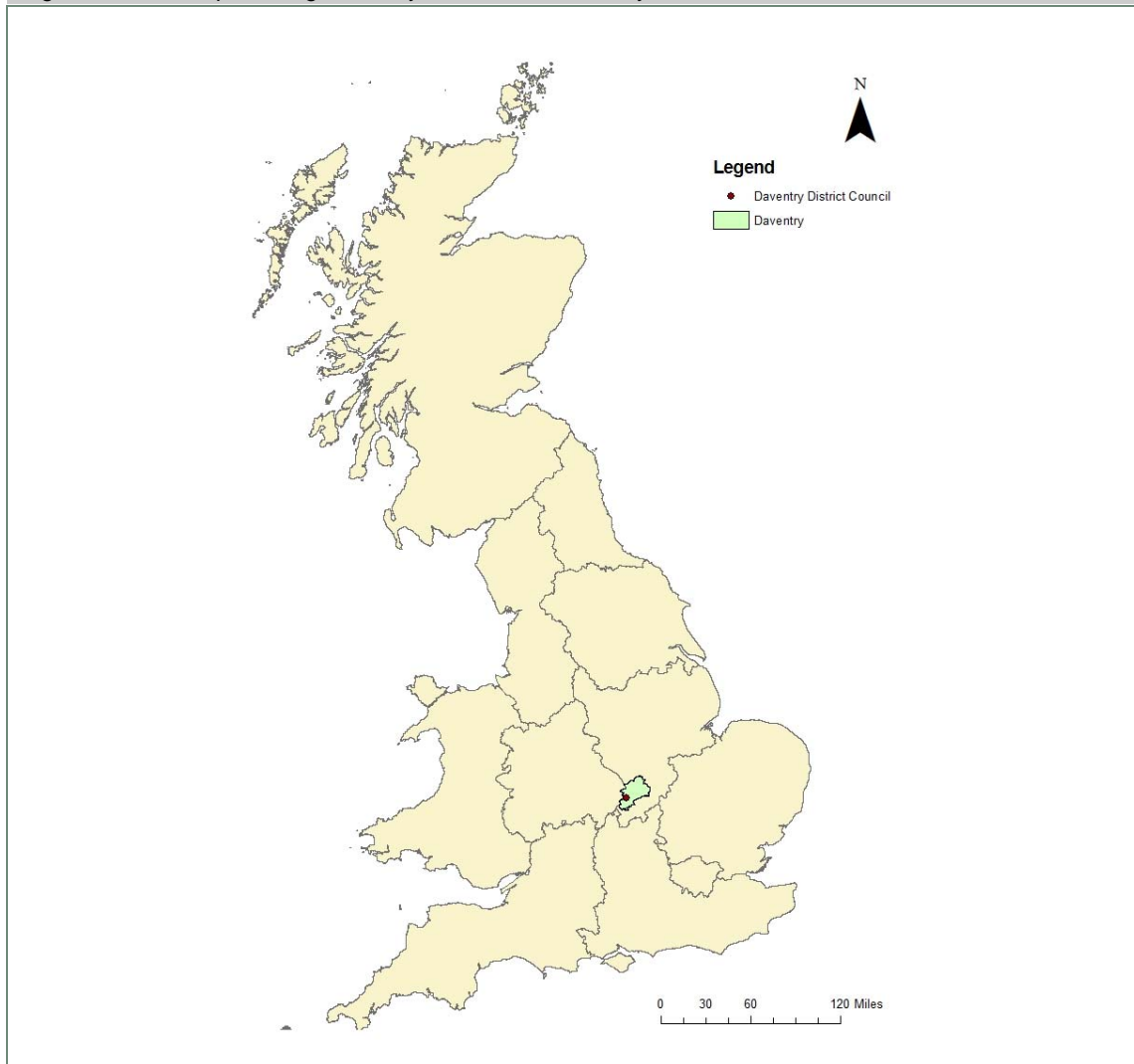
Source: Produced by SQW 2010. © Ordnance Survey. Crown Copyright. License number 100019086 and Postcode information © Royal Mail Group PLC

2.2   Like many localities in the United Kingdom, Daventry District Council sits within a two-tiered local authority structure. Certain responsibilities, such as the treatment and disposal of municipal waste, reside with Northamptonshire County Council (the 'Waste Treatment Authority' for Daventry district along with the six other districts and boroughs in the county). Daventry District Council, in contrast, provides waste collection services to the public. Waste

collection is considered to be one of the key services provided by Daventry District Council, in part due to its visibility, and because it accounts for fifteen percent of the Council's revenue budget.

2.3   Daventry's waste collection service has to cater for 32,092 households. In 2008/09, Daventry District Council collected 36,956 tonnes of municipal waste, of which 17,082 tonnes were recycled. Northamptonshire County Council as a whole treated and disposed 371,647 tonnes of municipal waste. Before optimisation, Daventry District Council had eight refuse and eight recycling vehicles which collected refuse five days a week. Subsequently, this changed to a four day week and the fleet reduced to seven refuse and seven recycling vehicles. There are 42 people employed across the direct delivery of the waste collection service, including both permanent staff and agency staff.

Local, national and international policy context

Efficient service delivery

2.4   Local government in the United Kingdom has for some time been expected to maintain and deliver enhanced levels of local service while ensuring resources are rationalised and cost-efficiencies and value for money maximised. For example, the UK government has set targets for local authority efficiency as well as efficiency across the public sector. From the financial year of 2004/5 to 2007/8, all councils were set an efficiency target of 2.5 per cent per year (which increased to three per cent in subsequent years). Performance against this target together with the steps they have taken to meet the target is reported by each local authority, which serves to provide ideas to other local authorities for innovation in service provision.

2.5   For Daventry District Council, the efficiency target of 2.5 per cent equated to a required saving of £360,000 for the financial year of 2005/6. For that year, Daventry exceeded their target by making savings of £589,000.

2.6   By jointly procuring route optimisation software with the aim of increasing cost efficiencies, Daventry and the other councils in Northamptonshire have been acting in line with a Government White Paper published in 2006, entitled 'Strong and prosperous communities'. This policy document encourages local authorities to make use of technologies as "important tools for transformation", also claiming that "joint procurement can help secure efficiencies by aggregating demand".

2.7   The added emphasis on reducing the wastage of public finances as a result of the recession, the drive to reduce public sector budget deficits and a change in government from Labour to the current Coalition Government mean that local government increasingly has to find clever and innovative ways to deliver key services with constrained resources. Daventry District Council sees itself at the forefront of this drive to cut costs of service delivery while maintaining standards.

Climate change and carbon reduction

2.8   The UK has the following long term legally binding greenhouse gas targets, as introduced by the Climate Change Act in 2008:

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- a reduction in greenhouse gas emissions of at least 34 per cent by 2020 from 1990 levels

- a reduction in greenhouse gas emissions of at least 80 per cent by 2050 from 1990 levels.

2.9   While these have not been translated into individual local targets for reducing emissions, local authorities are still encouraged to find ways to reduce emissions and are assessed on their performance in doing so. Two of the 198 National Indicators[ii] which the UK has used for measuring outcomes of local authority services and activities are relevant to action to mitigate climate change:

- NI 185 'Percentage CO_2 reduction from local authority operations'

- NI 186 'Per capita reduction in CO_2 emissions in the Local Authority area'

2.10   When the initiative was started in 2006, the current National Indicators (NI) relevant to mitigating climate change had not yet been established (they were introduced in 2008). These therefore did not play a part in the decision to proceed with waste collection optimisation. The indicators, however, had to be taken into account when further changes to waste collection service delivery were being considered after 2008, especially since refuse collection accounts for around 79 per cent of Daventry District Council's own transport emissions and around 30 per cent of their buildings and transport emissions combined.

Other policy drivers

2.11   The underlying drivers integral to the establishment of partnership working in waste management that made this initiative possible included European and UK central government drivers relating to waste policy, such as European targets for reducing waste going to landfill and the UK landfill tax. Local authorities have been obliged to come up with strategies on how they are going to make their waste services align themselves to the aims and requirements of these policies.[iii] In order to come up with a coherent integrated strategy, Daventry District Council along with the other six borough or district councils in Northamptonshire and Northamptonshire County Council found it necessary to form a collaborative partnership. The resultant Northamptonshire Waste Partnership (NWP) was in turn integral to the successful procurement of the route optimisation software.

2.12   The other key policy goal that this initiative helped progress within the local authorities involved was the European requirement for harmonisation of working hours. The initiative ensured that the routes made best use of the waste collectors' time and ensured that they were not working more than their contracted hours, thus avoiding overtime working.

3: Initiative and its aims and objectives

Summary of the initiative

3.1 The initiative aimed to optimise both the waste collection and recycling routes of all the boroughs and districts in Northamptonshire using GIS software. On behalf of the Northamptonshire Waste Partnership (NWP), Daventry District Council led the procurement of the software and consultancy support, which would help the councils plan the most efficient routes and co-ordinate the different waste collection vehicles involved. The impetus of the initiative came from Daventry District Council, with the Corporate Manager applying for funding on behalf of NWP.

3.2 The software, RouteSmart, which is based on a Geographic Information System (GIS) platform, combines a Global Positioning System (GPS), Ordnance Survey Transport Network data and other property information in order to generate maps showing the most efficient routes, as shown in Figure 3-1 and Figure 3-2. RouteSmart has been applied in two different ways:

- strategic optimisation: feasibility assessments were carried out by Integrated Skills (IS) Limited, the winning contractor for supplying the software, for a number of different waste collection scenarios

- detailed optimisation: used to determine the actual routes to be used.

Figure 3-1: Routing software used to generate maps of waste collection routes
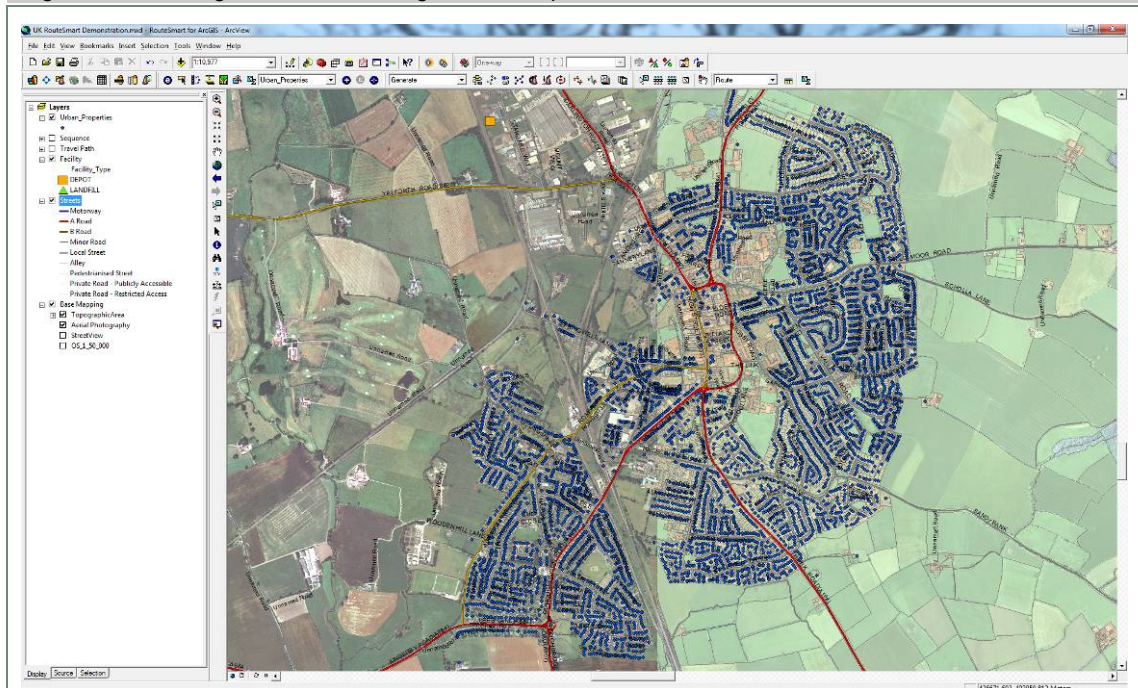
Source: Integrated Skills Limited. Note the map does not feature Daventry, but is representative of the technology.

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Figure 3-2: A close-up of a map generated pinpointing locations of bins for collection

Source: Integrated Skills Limited. Note the map does not feature Daventry, but is representative of the technology.

3.3   Data on addresses of properties needing waste collected were entered into the GIS software, along with data on the existing routes which were used to 'calibrate' the software by setting travel speeds and service times. Layers within the GIS software then revealed the most efficient routes for waste collection, taking into account the following types of constraint:

- road constraints, such as one way streets, turn restrictions, speed limits, weight restrictions and restricted access times

- personnel constraints, e.g. drivers' working hours restrictions

- collection constraints, e.g. side-of-street service collection constraints or vehicle capacities.

3.4   'Snapshots' of the routes were then converted to PDF files and distributed to the waste collectors. The technology can automatically respond to the input of new data, which facilitates rapid modifications to routes. When new builds are added to the list of premises to receive collection, the 'snapshot' is updated and re-circulated. While Integrated Skills produced the original detailed route maps, employees of the authorities have been trained to use the software so that they can update the routes themselves once new data are available.

3.5   Daventry District Council has been able to save over £200,000 each year since optimisation by spreading workloads more efficiently between crews, reducing mileage and therefore fuel consumption and associated CO_2 emissions. This saving is separate from the cost of purchasing and implementing the new system which was a cost borne by NWP. The other authorities also achieved reductions in greenhouse gas emissions through reduced distances

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travelled. The software has also meant that fewer vehicles have needed to be purchased by the authorities involved, since the current vehicles are used more efficiently.

Aims and objectives

3.6   The main aim of the initiative appears to have been the achievement of cost savings, justifying the funding received by the East Midlands Centre of Excellence (EMCE). The reduction of carbon emissions was seen to be a subsidiary benefit. Carbon calculations were undertaken at Daventry District Council to estimate reductions in CO_2 emissions.

3.7   Daventry District Council and the other local authorities did not have a set amount of money or CO_2 to save, but they did expect that introducing the technology would create savings in both areas. In order to get the funding, however, the authority did have to submit return on investment (ROI) calculations to EMCE and they did have to report back to EMCE on ROI subsequently.

3.8   Northamptonshire Waste Partnership, of which Daventry District Council is a part, also has wider sustainability aims. The NWP formulates strategies aimed to reduce waste going to landfill through waste treatment and recycling and has targets for recycling within the county as a whole, for example, 48 per cent of household waste by 2012/13. This is more ambitious than national targets set by the government as part of its Waste Strategy in 2007. As part of its strategy, the NWP has a policy to monitor and consider the impact of its activities in relation to climate change, though no specific greenhouse gas reduction objectives have been set.

4: Local authority involvement and other stakeholders

Local authority involvement

Daventry District Council

4.1   Daventry District Council, the initiator of the project, is the 'Waste Collection Authority' of the area (with Northamptonshire County Council as the 'Waste Disposal Authority'). Daventry project managed the procurement of the technology and now has the in-house expertise to run the software. They were also the first district in the Northamptonshire to internally optimise their waste collection, with the other districts and boroughs in the Northamptonshire Waste Partnership (NWP) following suite.

Northamptonshire Waste Partnership

4.2   NWP is a partnership operating under a Memorandum of Understanding and consisting of all eight Northamptonshire local authorities. The authorities are:

- Corby Borough Council

- Daventry District Council

- East Northamptonshire District Council

- Kettering Borough Council

- Northampton Borough Council

- Northamptonshire County Council

- South Northamptonshire District Council

- Borough Council of Wellingborough.

4.3   Figure 4-1 shows all the boroughs and districts in NWP, with the whole area constituting the county of Northamptonshire.

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Figure 4-1: The districts which make up Northamptonshire Waste Partnership (B refers to districts which have a Borough Council)
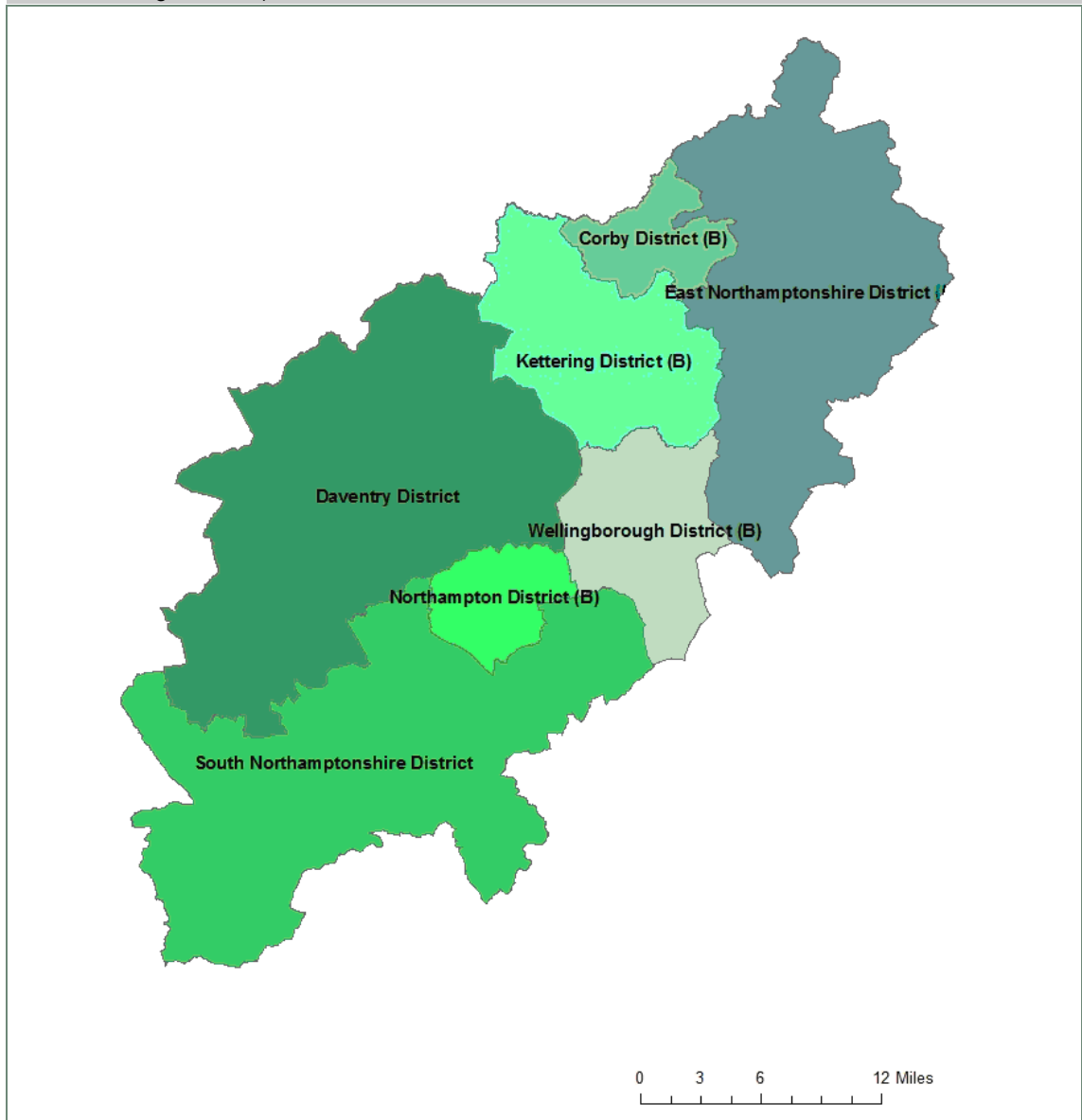
Source: Produced by SQW 2010. © Ordnance Survey. Crown Copyright. License number 100019086

4.4 Partnership working to manage municipal waste has been in place within Northamptonshire since 1996. It was only in January 2005, however, that more formal arrangements were put in place with the establishment of the Northamptonshire Waste Partnership Shadow Board. The aim of the partnership at the outset was to establish efficient and collaborative waste collection and disposal in the area. Plans have been developed for the collection and management of waste up to 2020 and beyond.

4.5 Collaboration was essential for this particular project because the small authorities do not have sufficient resources to afford the software by themselves. Using NWP as the delivery vehicle, economies of scale could be achieved. For example, only one license was necessary for the RouteSmart software. In addition, while all authorities had training in the software to a certain extent, the GIS officer at Daventry District Council who manages the GIS software also supports colleagues in the other councils with their use of the GIS software, since he was provided with the highest level of software training.

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4.6   This type of partnership working on the part of local authorities has been encouraged by UK central government, who in their White Paper on local government claimed that they would like to see the "sharing assets, systems, data, skills and knowledge more effectively" through "delivering more services in collaboration with each other, with other local public service providers and with the private or the third sector".[iv]

Partnership working arrangements

4.7   A project board, with overall responsibility for the project, and a project team were set up to ensure that all relevant stakeholders were part of the process. The project board included individuals from Daventry District Council, East Northamptonshire Council, Northamptonshire County Council, Northamptonshire Waste Partnership and East Midlands Centre of Excellence, and included both local authority officers and Councillors. The project manager was the Corporate Manager of Daventry District Council, and officers from Wellingborough Borough Council and South Northamptonshire Council were also on the project team.

Other key partners and their roles

4.8   The other key partners for this initiative were Integrated Skills Limited (IS), the lead supplier, and ESRI. Integrated Skills is a specialist waste management consultancy that holds the exclusive rights for the distribution and use of RouteSmart software in the UK. Integrated Skills responded to a tender to provide the software and also consultancy support. In tandem to the provision of software, they have also trained a number of local authority employees to use the software.

4.9   ESRI develops GIS software used by a large number of local and regional authorities. The RouteSmart product operates within the ESRI GIS product environment.

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5: Implementation and project timetable

Timeline of the initiative

5.1   The initiative started in 2006 when funding was applied for and the technology procured for NWP. The initiative is ongoing since the technology continues to be used to optimise the logistics of waste and recycling collection in the county.

5.2   Feasibility studies for different scenarios were tested using the software and it was originally envisaged that the initiative would not just involve internal optimisation of waste collection in each district, but would also involve the integration of more than one or even all waste collection services across the county, as shown in Figure 5-1, so that efficiencies could be maximised and distances covered by the waste collection fleet reduced. As yet, only internal optimisation within each district has actually been implemented, with all seven local authorities' waste collection routes optimised separately between 2006 and 2008.

5.3   The options for increased cross border working or the complete dropping of boundaries between the different waste collection services, either between one or more authorities or county-wide, have not been implemented for a variety of reasons. However, the mechanisms are in place for further consideration of these options in the future.

Project phases and progress

Procurement

5.4   The contract for supplying the technology was put out to tender in September 2006 and awarded to Integrated Skills Limited in October 2006.

Data collection

5.5   The very first stage of the project involved collecting all the data together. The seven district and borough authorities within the Northamptonshire Waste Partnership firstly wanted a common database of all the waste collection point postcodes in order to facilitate their aspirational goal of considering cross-boundary waste collection.

5.6   The kinds of data that were required included maps of the roads (from Ordnance Survey), the locations of vehicle depots and collection points, the location of properties (obtained from the Local Land and Property Gazetteer, LLPG) and finally refined information about the properties, e.g. type of property. The latter was needed because although the LLPG provided a reasonable level of data, it did not specify whether properties were flats with bulk bins or houses with wheeled bins, and this would affect the time taken to make a collection and the amount of refuse to be collected.

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Figure 5-1: Stages of the initiative
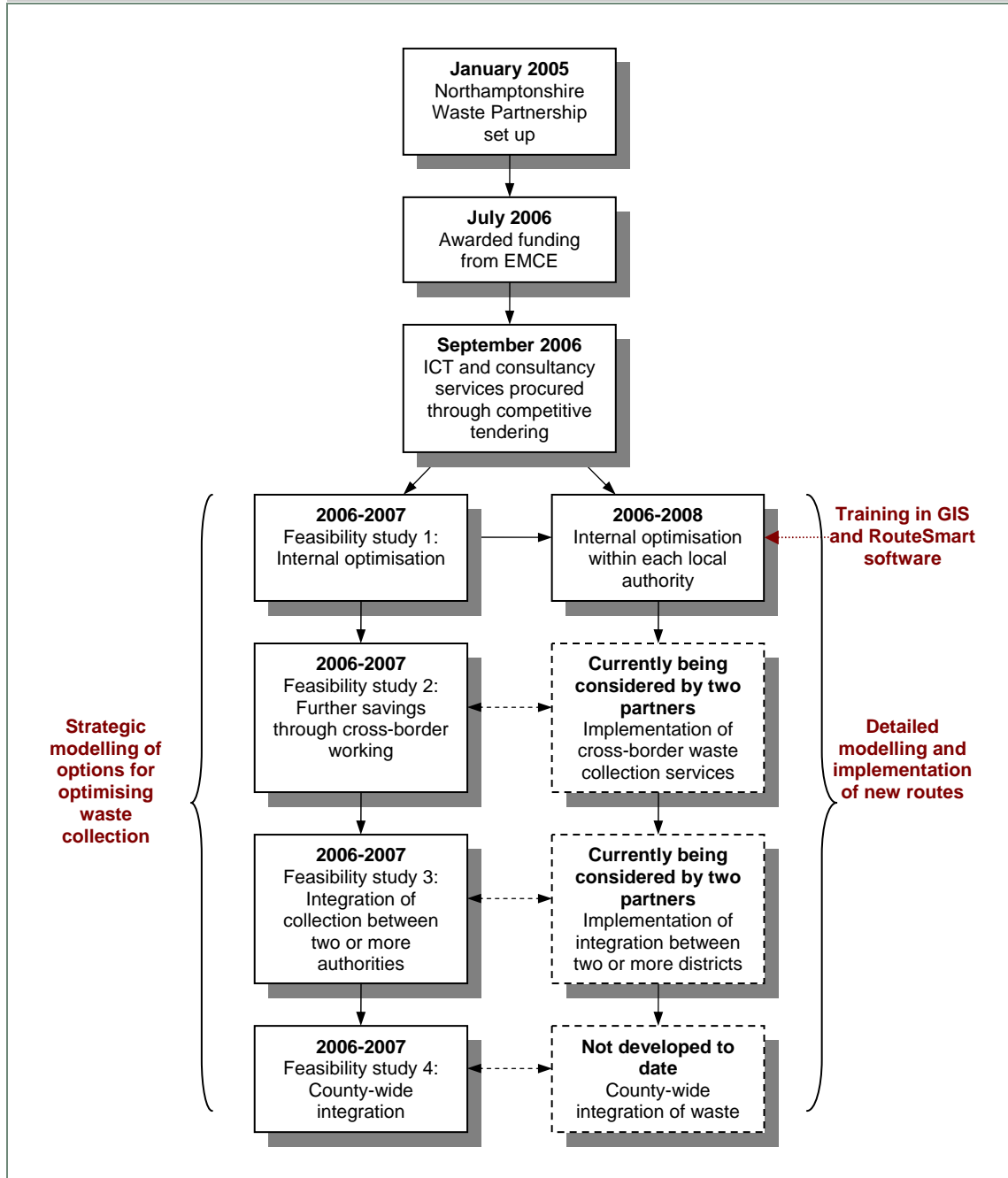
Source: SQW

Strategic modelling and detailed planning

5.7   The ICT was used in two different ways in order to help minimise the distances covered by the waste collection fleet. Firstly, strategic modelling was undertaken, for a number of different scenarios, and feasibility studies for each scenario produced. The modelling showed how distances travelled by the collection fleet could be reduced and how much money could be saved for each scenario. In addition, a number of other questions could be answered using the software, e.g. how many vehicles would be needed, what working hours the drivers would be doing and whether there was a balanced workload between all the vehicles.

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5.8   In total, four different scenarios were modelled and feasibility studies produced:

- Feasibility study 1: modelling of the most efficient routes for each waste collection authority separately, by taking data of existing rounds from each local authority and optimising on this basis.

- Feasibility study 2: identifying options for further savings through cross-border working, in which separate waste collection services would be retained for each of the districts, but waste collectors would cross boundaries in a small number of cases if there were very good logistical reasons for doing so (so-called 'nibbling').

- Feasibility study 3: options for the exploration of integration of collection services between two or more authorities. This study included the steps needed to implement integration.

- Feasibility study 4: options for the exploration of full integration of collection services at a county level, including steps needed for implementation.

5.9   Upon completion of a feasibility study, it was found that the second scenario was not cost effective. In contrast, it was concluded that for all other scenarios, a business case existed for revising waste collection schedules and for future consideration of integrating waste collection services (in the latter two scenarios).

5.10   Following the strategic modelling of the various options, the next phase involved detailed route mapping to improve the existing collection rounds in the individual local authorities. In contrast to the strategic modelling, this stage required highly accurate and fine-grained data inputs.
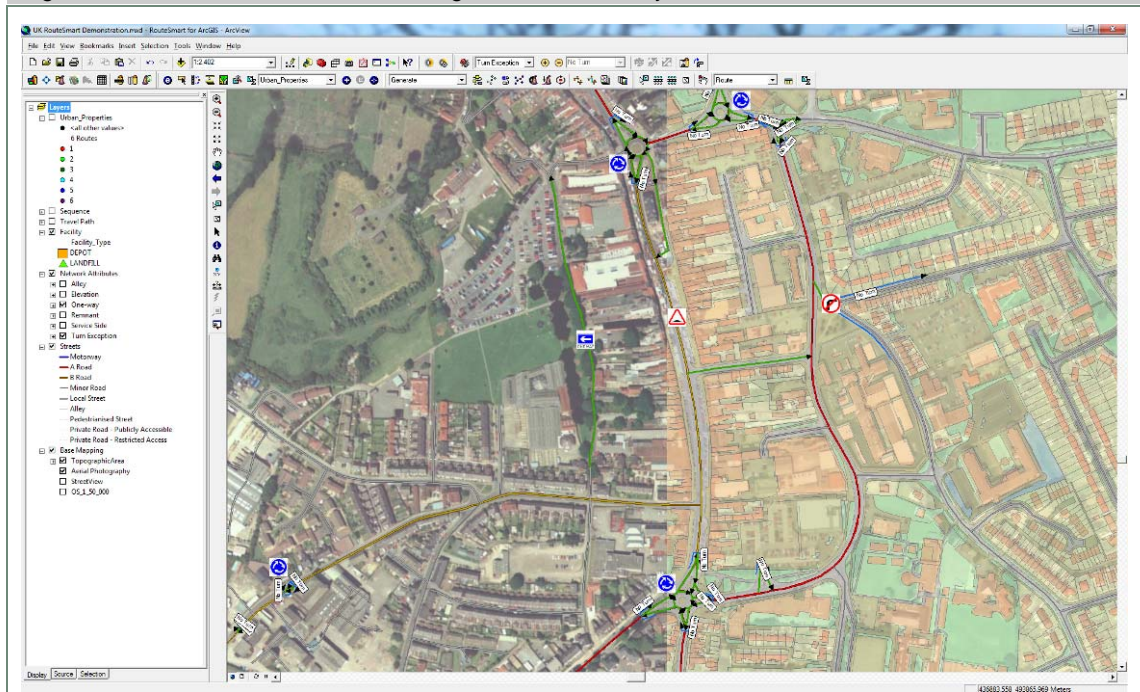
Figure 5-2: Routes shared out by different vehicles
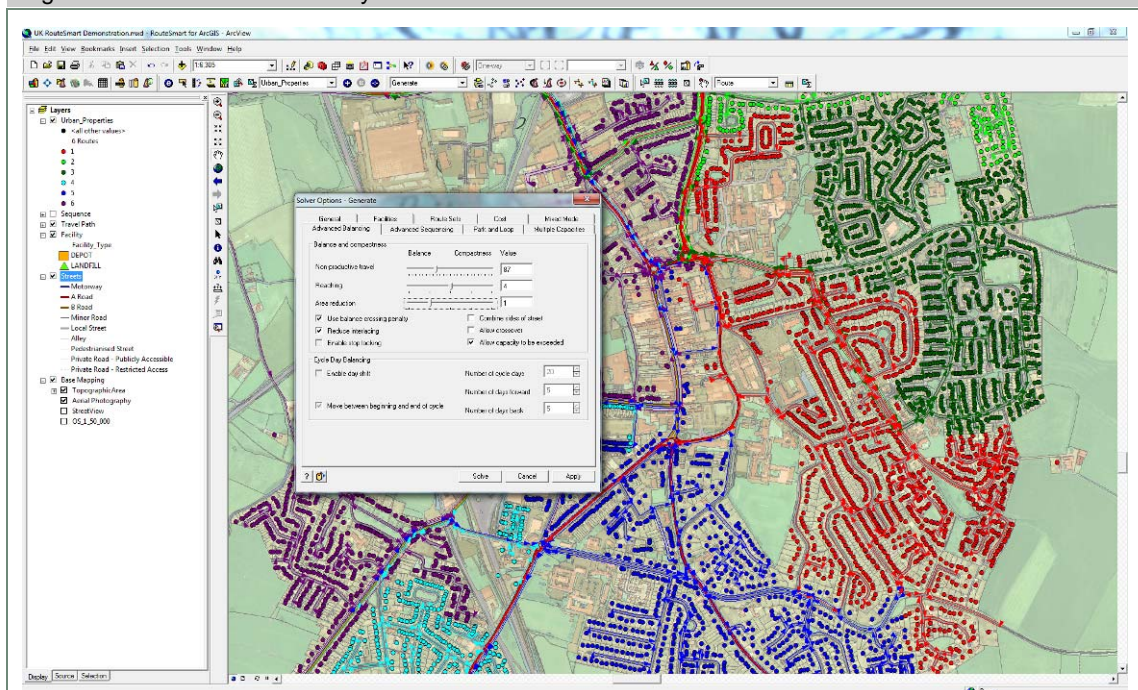
Source: Integrated Skills Limited. Note the map does not feature Daventry, but is representative of the technology.

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5.11   The new routes were then piloted in Daventry in October 2006. Subsequently, optimisation was successively rolled out to the other six local authorities in the 18 months that followed.

Figure 5-3: RouteSmart software showing alternative GIS layers

Source: Integrated Skills Limited. Note the map does not feature Daventry, but is representative of the technology.

Training

5.12   NWP decided that it would be beneficial to have two separate training courses for those to use the software in the various councils. The first was a general course in GIS and the second, training in the particular route optimisation software, provided by Integrated Skills, the supplier of that software. It was thought retrospectively by the supplier that the original training in GIS was not actually necessary for those using the software; all that was necessary in order for those to be able to follow the software training was basic IT skills.

5.13   According to the supplier, the best combination of expertise required in order to use the software successfully comprises of a GIS expert, an IT expert (often combined) and someone who understands the nuts and bolts of waste management. Knowledge of these different elements guarantees the continued usage of the software and ensures that savings are sustained within the local authorities once the original optimisation undertaken by the supplier becomes out of date.

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6: Financial details and funding sources

Funding sources

6.1 Funding for the initiative came from the East Midlands Centre of Excellence (EMCE) which has now become the East Midlands Improvement and Efficiency Partnership (EMIEP). The EMIEP is a regional a partnership of all 46 local authorities and the five Fire and Rescue authorities in the East Midlands which provides support to local authorities relating to the cost efficiency agenda.

6.2 The funding was awarded because Daventry District Council and NWP were able to demonstrate that efficiencies would be achieved through the formation of partnerships and collaborative working, attributes which were favoured by the EMCE in applications. The application included an ROI, which estimated that the benefits of integrating waste and recycling collection routes across NWP at £2.3 million. Subsequently, the authorities had to submit financial details to EMCE to show that cost efficiencies had indeed been achieved.

6.3 The grant received by Daventry District Council from the EMCE totalled £120,000. This was sufficient to pay for the entire initiative apart from a very slight overrun which was covered by the authorities in NWP. A licence each year for the software (costing around £6,000) is paid for by NWP, who are better able to afford this cost compared to the local authorities by themselves, as all the districts are able to share the costs of the software between them.

6.4 The local authority is also currently investigating the possibility of receiving Regional Improvement Efficiency Partnership (RIEP) funding from the EMIEP for the procurement of further route optimisation software to help streamline waste collection.

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7: Success factors and key barriers

Evidence of success

Energy savings

7.1   Daventry District Council has found that there has been a reduction in net emissions as a consequence of the initiative. This is due to fewer miles having to be travelled and reduced congestion. From around 2,400 miles per year, now the collection rounds only cover about 1,600 to 1,800 miles per year (a reduction of 40 tonnes of CO_2).

7.2   In order to reduce travel distances further, while the software is located on a server at Daventry DC, the partners in the Northamptonshire Waste Partnership do not need to travel there; instead they can log-on and access the waste collection routes remotely.

Cost savings

7.3   The following financial successes materialised in the first year of implementation of internal optimisation at Daventry District Council, with many of these savings achievable annually through continued use of the software:

- a 12 per cent reduction in the distances travelled to complete the waste collection and recycling rounds and an associated £25,000 per annum saving on fuel costs

- a saving of £28,000 due to evenly distributing the workload across different crews and cessation of overtime

- the addition of a new vehicle has led to a capacity increase of 14 per cent without a corresponding increase in labour hours, meaning that waste collectors were able to collect an increased quantity of waste without increasing the time spent on collection – the spare capacity allowed staff to undertake additional vehicle washing which secured savings of £17,000

- Daventry District Council was able to purchase a smaller vehicle than had previously been planned because the other vehicles were being used more effectively, saving around £25,000.

7.4   In addition, the other local authorities in NWP have also benefited, although to a varied extent, with at least five to ten per cent improvements in productivity (mileage, labour hours or both). For example, Northampton Borough Council was also able to achieve a saving of around £125,000 in the first year using the software because it meant they could delay purchasing a new vehicle in that year, although, they will eventually have to purchase a new vehicle due to population growth and the ensuing rises in the quantities of waste to be collected.

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Key barriers and issues

Data availability

7.5   One critical challenge is that the waste collection routes produced can only be as good as the accuracy of the data which is inputted into the software. This process was complicated by the fact that the data were available in different formats in the various councils. While some of the authorities already had some form of GIS software – Daventry, for example, had been using GPS tracking software since 2000 – other councils relied on more manual methods to determine routes for waste collection. The time taken to manually input data therefore slowed down the process of data input and collection.

7.6   There were also some issues relating to the reliability of data within the 'Local Land and Property Gazetteer', an address database maintained by local authorities in the UK. It was important therefore to consult the waste collectors in order to ensure that the routes would be feasible and made sense in practice.

Acceptance of software

7.7   Another challenge to implementing the new routing software was the need to gain acceptance of the waste collectors who would actually have to travel on the new routes. These council workers already had on the ground knowledge of the areas and did not want to feel that this was being superseded by a computer program.

7.8   The waste managers, supervisors and drivers initially had extremely varied responses to the introduction of the software, with some welcoming it more than others. In order to combat scepticism as to the utility of the software, both the supplier and the Daventry District Council found it highly important to engage these employees at the earliest possible stage in the process to get them interested and willing to contribute to the process.

7.9   The software supplier sat down with waste managers and collectors with the system live to explain how it worked, to examine individual routes and so they could comment on the feasibility of these routes and the accuracy of the data. If a route did not make sense to the waste collectors or did not reflect where the bins were actually accessed, for example, if the bins where accessed through the rear of the property, the routes could be tweaked to take this into account. In this way, waste collectors felt involved in the decision-making process and that they 'owned' the routes which were actually used.

7.10   When new routes are being planned, e.g. to account for newly constructed properties, the GIS officer works with the service manager in the waste department to ensure that the routes continue to make sense from a practical point of view.

7.11   Another barrier emerged upon actual implementation of the revised routes. When the waste collectors first started using the software, the route instructions were found to be too detailed and unnecessary in order to carry out their jobs effectively. Once this was scaled back, the software was seen to be much more helpful.

Figure 7-1: Waste collection at Daventry

Source: Integrated Skills Limited.

7.12   Getting people to accept the software was made more difficult by the fact that some of the training was not appropriate for the attendees: for some attendees from the different councils, the GIS training in particular, was too technical and many of those that attended were policy officers who would not actually have to use the software. The same issue did not occur with the specialised software training provided by the suppliers to the GIS officer at Daventry DC and the Service Manager at Wellingborough as only basic computer literacy was required, and this was subsequently relayed to other GIS officers in the other local authorities in a more informal way.

Partnership working

7.13   Persuading all the partners in NWP of the benefits of changing their working practices was essential for the success of the project, especially the elected members from the various councils. Certain districts were initially hesitant about signing up to optimisation, but once they realised the benefits, there was full support for the initiative.

7.14   Willingness to participate was aided by having the scheme rolled-out consecutively in different local authorities. The remaining local authorities could then see evidence of the benefits of route optimisation. In January 2007, a showcase event was held to share results and publicise the efficiency savings that had taken place at Daventry District Council's to increase buy-in from the other authorities.

7.15   Successive implementation of the routes had other benefits for the partnership: implementation improved as Integrated Skills gained a better knowledge of the area.

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Contracting out

7.16   Where the waste collection service was run by an outside contractor, this could be a barrier to route optimisation, as was the case in Corby Borough Council and East Northamptonshire Council. Integrated Skills has found that the best way to avoid these issues is to enable a certain degree of flexibility of routing in the contract, as well as setting out arrangements of how cost efficiencies can be apportioned to the different parties. This has occurred successfully elsewhere in the UK, for example, in Bath and North East Somerset, where collections have also been optimised.

7.17   Ultimately, outsourcing was not too problematic for Corby Borough and East Northamptonshire District Councils, because the councils were still able to input into the routes: they are the ones that receive complaints if the service is not up to standard so they have retained a certain element of control over the logistics of waste collection.

Barriers to integration of waste collection services

7.18   At the time of the initiative, no decision was made relating to county-wide integration of waste collection services in Northamptonshire due in part to key practicalities which made this option difficult to implement (as described below in Section 7.22). Nevertheless, the initial project of optimisation and the feasibility studies have helped support further work in this direction, and Daventry are now exploring options for joint working with Northampton Borough Council, including, cross-boundary collection.

7.19   Other local authorities, however, may wish to fully integrate waste collection because there may be considerable economic and environmental benefits. Optimising routes over a larger area can in some circumstances reduce mileage and reduce the number of vehicles required to carry out collection.

7.20   If a local authority were to choose this option, there are a number of possible barriers to implementation. Research across the UK has demonstrated local authorities may find internal opposition to integration because there are other compelling reasons for not proceeding, for example, local authorities lose an element of control of the collection of waste, but are still accountable for the service. Integration may be detrimental to local accountability with the electorate as the authority loses their local presence, especially since waste collection is one of the most front-facing responsibilities that councils have. This has been found to be an issue in various parts of the UK, and is particularly felt within smaller councils that do not want to see their local waste collection subsumed into a larger council's services. In addition, standards may be variable across different localities and councils may fear that integration will cause a deterioration in the quality of the service provision.

7.21   Large unitary authorities, however, where the responsibilities of county and district authorities have been amalgamated to create one authority, so that all waste responsibilities reside in the same authority, will not face the same issue, although there may still be some legacy constraints.

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Practical issues

7.22   If councils do go ahead with dropping waste collection boundaries, then there are many complexities that must be resolved. Not least is the issue of how to measure individual local authority performance against National Indicators, or other measures of performance which may be used to assess waste collection services or CO_2 reductions, where the delivery of services is shared between authorities.

8: Transferability and longevity

Scalability

8.1 This kind of initiative suits large cities and groups of local authorities working jointly together. This is because the cost of the software may make implementation prohibitively expensive for smaller authorities individually.

8.2 Potential issues are more likely to occur with scaling up, not due to the functionality of the technology, but relating to who has the responsibility for waste collection. While shared procurement at a county level is highly feasible, it is more difficult to introduce what could be considered the most optimised routing (county-wide integration of waste and recycling collection services), because this could be perceived as reducing the control and accountability of each individual council.

Transferability

Other locations

8.3 It appears that the technology can easily be transferred to other localities (it has been used already in Berlin, Dusseldorf and Munich), especially where partnership working is well established. GIS is already widely used by local authorities so can be easily applied to waste collection.

8.4 Since cost efficiencies are also achieved, in addition to transport energy savings, a wider variety of funding sources are available for this kind of initiative. In the UK, this can come from Regional Improvement and Efficiency Partnerships, and other EU member states may have equivalent funding streams.

8.5 A potential barrier for some councils wishing to implement this technology is operational arrangements of waste collection. Waste and recycling collection is increasingly being outsourced, meaning that the councils no longer run the waste collection themselves. As long as flexibility is allowed in the contact, however, to provide for local authorities dictating changes to routes in order to maximise efficiency, this issue should not insurmountable.

Other applications

8.6 In terms of transferability, the technology seems to have many other applications as the software can be used generally for planning logistics and is not bespoke for waste collection. Some other applications are already being investigated by Northamptonshire Waste Partnership using the same software. Possibilities include:

- litter collection and street cleansing

- winter gritting

- the checking of addresses to improve Council Tax collection.

8.7   Another potential use for RouteSmart software is to help judge bids for waste treatment or disposal sites proposed by developers, by comparing costs of the new routes for vehicles depositing waste at the different sites. This use was being investigated by Milton Keynes Council and Northamptonshire County Council (as waste disposal authorities) as part of the procurement process for a joint waste treatment facility which was to be procured utilising PFI funding of £138 million. Although this project has now been cancelled (due to the withdrawal of the £138 million of central government funding) and what will replace it is still under investigation, it shows one of the many applications for which logistics software can be utilised to improve energy efficiency.

Future of the initiative and longevity of impact

8.8   As long as NWP is able to budget sufficient resources to pay for the licence and the authorities can allocate employee time for the updating of routes as new properties are constructed, the fact that the authorities have had training in the software and therefore have in-house expertise means that the energy savings achieved can now be sustained into the future.

Future plans

8.9   This initiative has led to further collaboration between the local authorities involved. As an example, Daventry District Council and Northampton Borough Council are joining together to procure further GPS software with additional capabilities to enhance the waste collection service even further. They are considering procuring 'in cab screen displays' which show the same information as that seen at the depot and call centre. This means that if there are missed bins another waste collector can go back quickly, and previous missed bins can be highlighted so that the same mistake is not made again, saving on fuel and reducing carbon emissions, and helping to improve the service for customers.

9: Key lessons and conclusions

Conclusions

9.1 This initiative has been highly successful in reducing energy use through reducing the distances travelled on waste collection routes, and thereby reducing CO_2 emissions, in the county, despite not yet achieving one of its original aspirations of the county-wide dropping of boundaries between the waste collection services in Northamptonshire.

9.2 The ability to take forward this initiative can be attributed mainly to partnership working: Daventry District Council would not have been able to implement such improvements to its waste collection using ICT without NWP involvement, and the sharing of the technology between the various local authorities in Northamptonshire. Although it could have been possible to manually optimise routing with the help of local expertise, this would have taken longer to carry out and to update in light of new information.

9.3 The implementation of the software has also led to spin-off benefits for other areas of local authority delivery. Daventry and NWP have continually engaged with the software by finding new uses for it. In doing so, Daventry District Council and the rest of Northamptonshire have been able to maximise its use to help decrease carbon emissions in its transport fleet and also to improve ROI. This has been especially important since the software is expensive to buy and to maintain.

Route optimisation in the future

9.4 This kind of initiative is of increasing importance, given the current trends in housing and population growth across Europe, when minimising the emissions from waste collection services will become more and more challenging.

9.5 Given the political context of budgetary constraints which are currently being felt at all levels of UK government and elsewhere, Daventry also feel that because they have already taken action to reduce costs and deal with CO_2, they are now in a much better position to respond to the oncoming cuts in budgets. It is the kind of energy savings initiative which can be implemented in the current political and economic climate as even without external funding, it has economic benefits which can be realised in the first year after implementation if authorities share procurement.

Key Lessons

Key lessons - partnership arrangements

- Having a clear structure of responsibility, e.g. a project board and project team, as well as assigning clear roles to individuals, will enable the initiative to run more smoothly, especially where a large number of partners are involved.

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- Joint procurement can be highly cost effective for local authorities, in particular, smaller ones which would not be able to pay for ICT individually.

- Piloting of the software in one area can demonstrate the benefits of an initiative, and encourage buy-in for the initiative as a whole.

- If a decision is made to outsource services, it is important that any contractual arrangements allow local authorities to maintain some control if they want to change aspects of the service.

Key lessons - funding and finance

- It is not necessary to be confined by funding streams related to energy efficiency, carbon savings or sustainability. If the initiative also saves local authorities money, it is important to explore the possibility of other sources of funding.

Key lessons - initiative implementation

- It is helpful to involve those actually undertaking waste collection at the outset so that those with on the ground knowledge of routes can improve the outputs and help to make the initiative a success. Routing software is very effective at establishing a basis for the collection routes but needs to be supplemented with operational knowledge and experience.

- Ensuring that the local authority develops its own in-house expertise means that the initiative can continue even after the contract with the supplier to model the routes has been concluded.

- It is advisable to procure software which has the potential to be used for a number of different applications within the local authority, e.g. logistics software to reduce distances for a range of transport services. In this way use of the software can be maximised.

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Annex B: Further reading

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Annex C: Glossary

DDC   Daventry District Council

EMCE   East Midlands Centre of Excellence

EMIEP   East Midlands Improvement and Efficiency Partnership

GIS   Geographic Information System

GPS   Global Positioning System

ICT   Information and Communication Technology

LLPG   Local Land and Property Gazetteer

NI   National Indicator

NWP   Northamptonshire Waste Partnership

PFI   Private Finance Initiative

RIEP   Regional Improvement Efficiency Partnership

ROI   return on investment

Annex D: Key references

i   Office of National Statistics (2010) *Mid-year population estimates*.

ii   UK National Indicators have now been rescinded by the Coalition Government and it is not yet clear what exactly will replace them and how performance of local authorities will be measured.

iii   See Northamptonshire Waste Partnership (2008) *Northamptonshire Joint Municipal Waste Management Strategy 2008-2020.*

iv   DCLG (2006) *Strong and prosperous communities: The Local Government White Paper.*

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