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CENTRE FOR THE STUDY OF RETAILING IN SCOTLAND

**CENTRE FOR THE STUDY OF
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**Surveying Urban Retail Provision in
Scotland**

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TITLE: Surveying Urban Retail Provision in Scotland

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1. Introduction

The Centre for the Study of Retailing in Scotland (CSRS) is conducting research to explore the feasibility of creating and maintaining an integrated spatial database of retailing in Scotland. Geographical Information System (GIS) technology is being used and the intention is to make sample parts of the database freely available to the research community. The feasibility study comprises several linked projects to explore different data collection methods and establishment of the resource needs to use these different methods to compile a full and optimised data collection system¹. The study also includes evaluation of the methods needed to keep the database up-to-date and how to record the changes and the history of changes which are necessary for trends and time-series analysis. This feasibility study aims to cover a wide range of retail formats including retail parks, shopping centres/malls and conventional streetfront retailing. In addition, the database will provide a distinctive regional theme focusing on the multiple retailers operating in Scotland.

The GIS functionality facilitates the interrogation of the data for a variety of purposes. For example, to display locations of stores which share particular characteristics or to analyse the spatial dynamics and inter-relations of stores of different retail types such as adjacencies, clustering and nearest neighbours. Another example of GIS functionality is to extract vacant stores which exist within or beyond a specified radius from stores of a particular retail type which could be used to indicate the potential for further branching.

Surveying retail provision through comprehensive street surveys can be seen as worthwhile from a number of perspectives. Interest continues in the area of food

¹ A previous working paper No 0401 *An Introduction to CSRS Research* describes more fully the background to this project.

retail provision (so called "food deserts") with the focus now moving to the provision of healthy food. Provision of other services to potentially excluded people such as financial and postal is of current relevance; conversely over-provision of certain types of retail, e.g. "tourist tat", can also be a concern².

In the spring and summer of 2003 CSRS conducted a survey of fixed retailing activity across the whole of Edinburgh. This survey has been repeated in the summer of 2004 to validate and enhance the data collected in 2003. A spatial database has now been established from these surveys and contains essential basic information describing the parameters of individual shops such as retail type, geographical location, postal address and floorspace. The 2004 survey also offered the possibility of adding other store-based information omitted from the first survey.

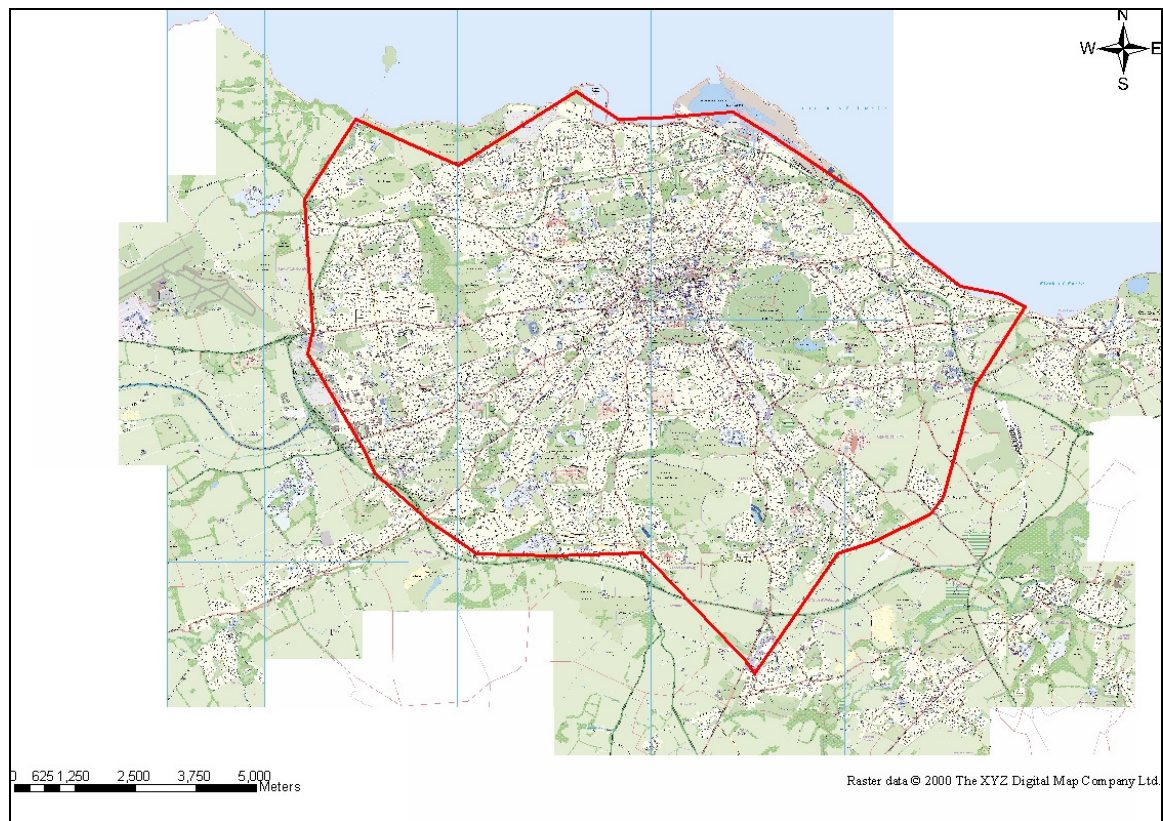
2. Methodology

2.1 Overview

The area being surveyed is much larger than the scope of typical commercial retail surveys which tend to concentrate on urban centres and "recognised" retail areas. It is defined broadly by the polygon encompassed by the A720 Edinburgh ringroad meeting the Firth of Forth coastline. This produces a roughly oval area 11.6 km north to south and 14.8 km east to west giving a total area to be surveyed of over 110 sq. km. See Figure 1. The 2003 work surveyed almost 7,000 units in this area and it is expected that this figure will increase significantly for the 2004 survey.

² For example The Scotsman *Tatty buy to quality on the Royal Mile*, 24 August 2004, p.8.

Figure 1: Total Survey Area

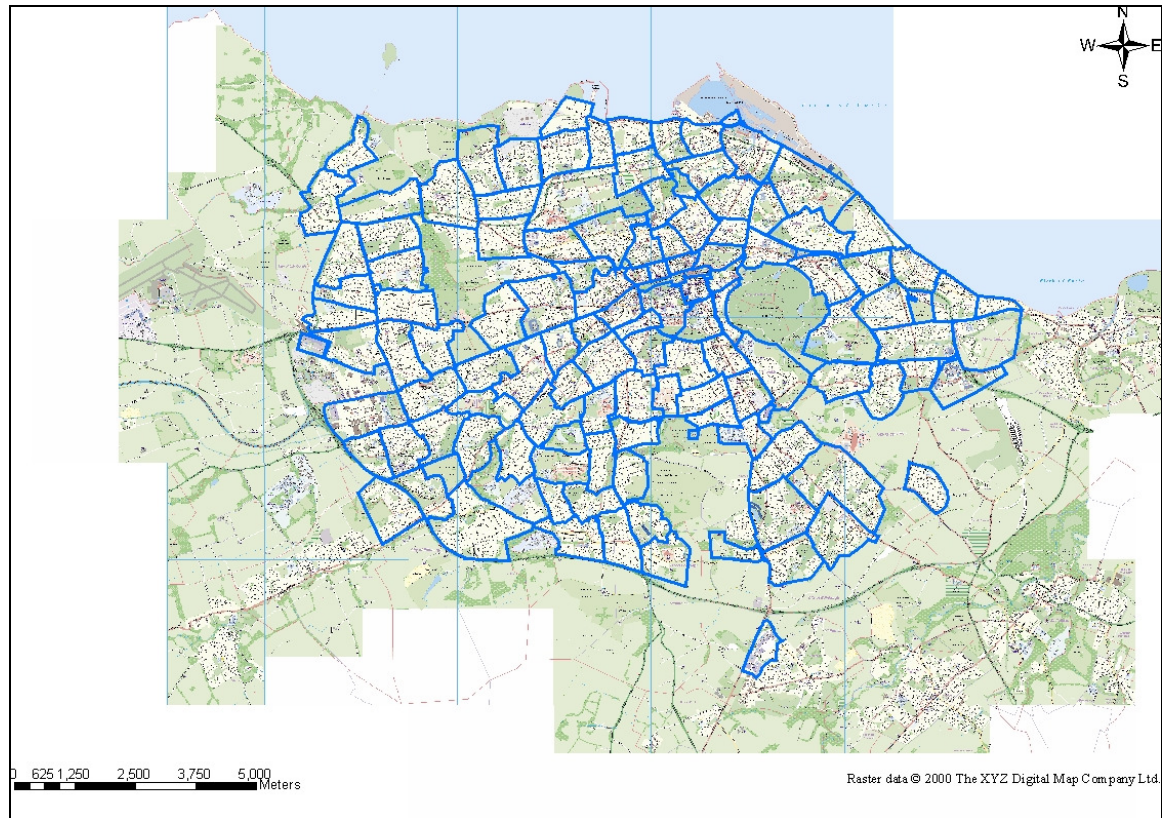


The total 110 sq. km survey zone has been divided up into approximately 130 working areas to be surveyed. See Figure 2. The survey consists of surveyors walking a pre-planned route through a working area and checking and amending the data held on retail activity in the area. The working areas vary in size and amount of retail activity but each one can usually be completed in a couple of hours. Not all areas are as straightforward as walking around city blocks - Edinburgh presents quite a complicated retail frontage, especially in the Old Town, with streets and frontages running above one another and at various angles.

In general the aim was for surveyors to carry out most of the work from the street itself with it not being necessary to enter premises. This maximises the productivity of the 2004 re-survey. All retail units (including vacant ones) that the general public use were re-surveyed. Therefore retail units within free tourist

attractions were surveyed. The criterion used was that the premises must have a door to a publicly accessible space, *i.e.* directly accessible off the street or similar.

Figure 2: Surveyor Working Areas



The following sections examine specific aspects of the survey method in more detail.

2.2 Area Definition

In the 2003 survey postal sector boundaries had been used to establish a quick framework of areas across Edinburgh. However on close examination of the results of that survey it could be seen that a number of problems had arisen. There were a significant number of duplicates (and absentees) of a single or a cluster of units on area boundaries. These had arisen because it was unclear where exactly a postal sector boundary extended at the scale of the map being used. In these cases units had been surveyed twice (or not surveyed at all), as being in two different areas (or not being in either area) and had been processed

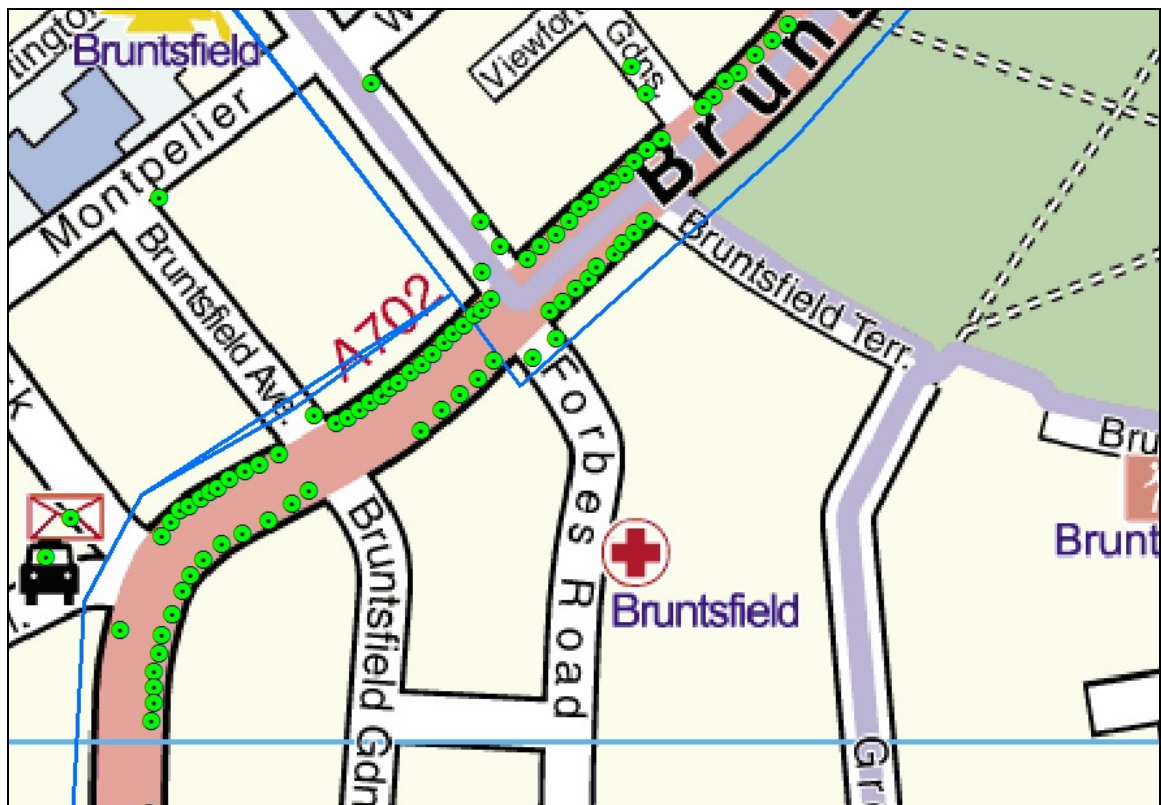
into the database without being picked up. In one case this was also due to the entrance of an establishment's grounds being in one area and the entrance to the building itself being in another area.

To rectify this problem a large number of areas, especially those with a higher retail concentration, were redrawn with the following aims:

- no run of shops should have a boundary arbitrarily through the middle of it;
- distinct conglomerations of shops were kept together as a survey area;
- boundaries should run down the middle of main roads to enable discrete urban blocks to be identified and surveyed as a whole;
- and clear "natural" boundaries such as rivers and railways and gardens/parks were also used to define area demarcations.

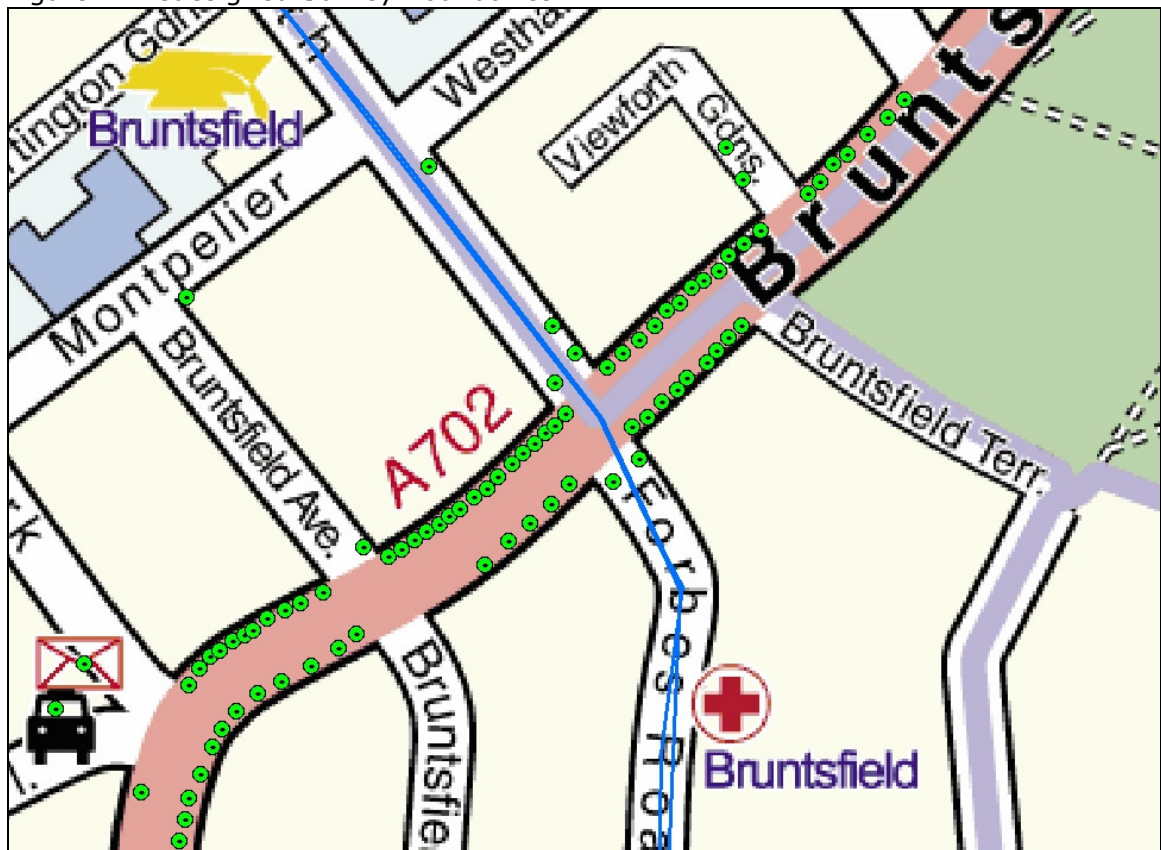
For example in the centre of Figure 3 it shows the original boundaries (blue solid lines) cutting through two runs of shops (green filled circles) on both sides of a main street. Changes to units at these boundaries would be open to confusion as to which side of the boundary they lay. In Figure 4 the main street still has the boundary bifurcating it but this occurs at a major intersection to lessen the risk of misplacing units across boundaries.

Figure 3: Original Survey Boundaries



Raster data © 2000 The XYZ Digital Map Company Ltd.

Figure 4: Redesigned Survey Boundaries



Raster data © 2000 The XYZ Digital Map Company Ltd

Locating retail units (points) within their correct survey areas (polygons) is also important for future analysis as point-in-polygon operations can play a significant role in GIS analysis.

Whilst redrawing areas was quite time-consuming it did ensure that a thorough examination of areas was performed. This revealed a number of duplicates and missing units that had not been picked up through previous checking.

2.3 Retail Type Classification

There are many different ways in which retail establishments can be differentiated or classified. Size, price, category and specialisation are four of the many dimensions by which retail formats may be analysed³. For the purposes of surveying retail provision one of the most important pieces of information we can collect is that of what types of goods and services are being sold. This information is not only valuable but also has the advantage of being relatively straightforward to collect.

The classification being used is a derivation of the Annual Business Inquiry classification based on SIC codings from the Office of National Statistics (ONS). This is predominantly based on type of product sold with little assessment being made of the quality of the offering. For the CSRS survey there has been some differentiation based on range, specialisation and quality where deemed appropriate.

The 2003 survey attempted to capture multiple definitions of retail type. A unit could be typed up to three times to indicate the various products and services being retailed. A hierarchical classification system was used – see Appendix 1.

³ Oxford Institute of Retail Management *Assessing the Productivity of the Retail Sector* April 2004, p.17.

This hierarchy allowed entry from a menu system on the PDA survey equipment. However this introduced too much flexibility in the classification system – resulting in entries at different levels of the hierarchy in three different columns. Errors also arose through the use of the PDA menu select interface. For example three public houses ended up being classified as publishers.

It was decided to focus on just classifying the primary and secondary activity of a retail unit with some evolution of the classification system. Notable enhancements tried with the 2003 data and implemented for the 2004 survey have been:

- redefining type 13 to be Specialist Small Food Store;
- accessories were added to Ladies Clothing (32);
- a separate type for Childrens Clothing and Shoes (36) was introduced;
- a separate type for Sports Clothing and Equipment (37) was introduced;
- a separate type for Phone, Mobile Phone and Accessories shops (47) was introduced;
- a separate type for Souvenirs and Gift shops(48) was introduced;
- Chemists & Opticians (51) split into three distinct elements – Health Beauty & Cosmetics retail (50), Dispensing Chemist (510) and Optician (511);
- Leisure & Recreation (56) includes outdoor equipment AND clothing;
- a separate type for Antiques, Fine Arts, Rugs and Pottery shops(66);
- type 71 was made solely Video/DVD hire due to its dominance of the category with Tool Hire moving to its own type (73);
- key cutting moved from Trades (120) into Repair Shops (72);
- Hair & Beauty (122) split into two distinct hairdressing types Ladies & Mixed (122) and Barbers (1221) and the beauty service component (1222);
- 1222 also incorporates saunas and tanning studios;

- Served Food retail has been split into two categories based on convenience – type 140 is for restaurants and bistros and type 141 for more convenience orientated food shops.

These changes are shown in Appendix 2. One advantage of the PDA system is that the lowest level of description of retail type was collected in the 2003 survey. This allowed straightforward re-categorisation of units as described above. In 2004 to aid the speed of survey only the type code, e.g. 56 for Leisure and Recreation has been collected. This will make re-categorisation of new units harder without the low-level description of type.

The basis for these changes was to develop a more logical breakdown of product areas, especially with the aim of highlighting recent retail developments. However there is a danger that a classification becomes too responsive to current retail strategy and simply reflects the fashion for the retail of products and services in certain groupings, especially those groupings used by the larger retail chains. It is necessary to allow some analysis of retailers as being classified as a number of different types. In certain cases the boundaries between products are blurred and it is logical to analyse their retail together, e.g. sports clothing and sports equipment; and outdoor clothing and equipment. Indeed there may be a case for a distinct type – Physical Activity that encompasses both these sub-types.

Having types that encompass a greater number and variety of shops will produce more robust analysis. However analysis may show, for example, a level of competition within a type that, in reality, is non-existent because shops within the type are well differentiated in their offering. Cluster analysis encompassing a low-level of product classification along with location, scale, quality, price and

other dimensions may be a less subjective method to arrive at a representative retail classification.

2.4 Multi-level Retail

To capture the various combinations of possibilities of multi-level shops and multi-level buildings in an efficient way two fields have been used. The first is a single character numeric field that indicates 'access level' to the retail unit. Zero is entered if the unit is reached from street level (*i.e.* the pedestrian zone outside the unit); negative one is entered if entry is down in a basement from street level; and one is entered if entry is via stairs or a lift. The second field is a multiple entry field that allows the surveyor to enter all levels of the building that the unit occupies as numeric codes.

For examples see Table 1 below.

Table 1: Coding of Multi-level Retailing		
Case Example	Access Level	Floor Levels
Conventional shop on a high street occupying the ground floor solely	0	0
A shop occupying just the second floor of a shopping centre	0	2
A shop occupying just the second floor of a building on a high street	1	2
A department store occupying many floors of a building on a shopping street	0	-1, 0, 1, 2, 3

This convention discriminates effectively between different types of multi-level retailing for subsequent analysis purposes. The Floor Levels field can be processed further after data capture to determine the total number of floors of retailing.

Mezzanine floors offer the opportunity of a planning loophole for retailers but this was not deemed a significant enough issue to be targeted specifically as a data capture target. This scheme does offer the opportunity to capture data on

mezzanine floors as these can be added as 0.5 decimals which would be picked up by subsequent pre-analysis data processing. Disabled access however is becoming an important issue for retail and is covered in the next section.

2.5 Disabled Access

The re-survey this year includes for the first time a rating of the accessibility of the premises for disabled customers. Since 1st October 1999 under the Disability Discrimination Act service providers have had to take steps to make reasonable adjustments, including overcoming physical features (*e.g.* access into buildings) which would enable disabled people to use a service. From 1st October 2004 service providers have additional duties in respect of physical features that make it impossible or difficult for disabled people to use their service. Basically, any feature denying a disabled person access will have to be either removed, altered, avoided or an alternative measure made available. However some buildings are listed and therefore cannot easily obtain planning permission to make external alterations. Also, premises that are leased will need permission from landlords, which could mean that the people providing the service may not own the building and are therefore not responsible for making the alterations.

Edinburgh has a large central core of historic premises, many with traditional stepped entrances and the results of the 2004 survey will provide a useful summary of the distribution of accessible services.

3. Data Capture

In 2003 the survey used a handheld PDA (Compaq iPAQ) running PocketGIS software. These allow direct interactive annotation of a map in a GIS to enable locations of retail premises to be captured along with information on that premise. Data capture was facilitated through the use of menu selection for

information such as 'type of retail'. GPS (geo-positioning satellite) based technology had been considered in the initial stages of the project but had been discounted due to inaccuracies arising in location finding because of radio signals being bounced off and diffused by tall buildings. Its use within multi-level buildings such as shopping centres may also have been problematic.

For the 2004 re-survey it was decided to use a paper-based system of printed colour maps showing the location and ID number of retail premises. These were accompanied by a form listing the existing premise with its associated information and a blank line beneath each entry to allow amendments to be entered.

This might seem a somewhat anachronistic approach in the 21st century however there are a number of benefits.

An A4 map is considerably easier to read than a 5 by 7 cm computer screen and reduces the number of units being misplaced due to location misidentification. Completely new units were identified through annotation of the paper map and entering their details onto the form.

A paper-based system offers other benefits such as a quicker learning curve; more flexibility; lower risk be it technical, theft or accidental damage; and being considerably cheaper allows a higher number of surveyors to be working in parallel.

The handheld GIS offers the advantage that it allows a number of steps in the survey process to be integrated together. By directly annotating a GIS on-screen point data can be recorded automatically with its location. The captured data can then be offloaded from the PDA directly into the desktop GIS, without the need to be concerned about geographic co-ordinates. This makes it well-suited to

surveying areas with no prior knowledge. It also removes the production and handling of large amounts of paper maps and forms. The 2003 survey was still time-consuming from a management point-of-view though because of the limitations of the memory within the handheld computers. This meant that only a small number of areas could be loaded onto the handheld with their maps and points. Consequently surveyors had to frequently return to base to have completed areas and maps removed from the system and new areas added. The memory-limiting factor is becoming less of an issue as the price-performance of handhelds continues to improve with the rest of the computing industry. The memory of the handhelds used was just 64 Mb.

Neither system copes particularly well with wet survey conditions however because data-entry is separate, and indoors, from data-capture the paper-based system allows higher productivity as more units can be surveyed in dry conditions and data-entry can proceed on wet days.

Under the paper-based system data entry was carried out by using Excel. Spreadsheet files were produced of each area which were then amended by the surveyors using their own data capture sheets. New retail units required use of the GIS system to identify their location and enter their details directly into the GIS database.

4. Process and Cost Comparisons

Table 2 below reviews an approximate cost comparison of the two methods of data collection as described in the previous section.

Costs common to both methods and therefore not compared in the table include the cost of the base maps of Edinburgh. These cost £1500 for 1:10 000 scale

rasters (the picture image of a map). For the PDA method these were used electronically within the PocketGIS software on the PDA. For the paper method various views of these maps were printed out in colour for each area. These maps were also used in subsequent checking, analysis and reporting within the desktop GIS system. It is assumed that travel expenses for both methods were approximately equal.

	PDA	Paper-based
Hardware (two PDAs)	£330	-
Memory cards (two)	£44	-
Software (2 PocketGIS licenses plus support)	£1900	-
Card reader	£30	-
Paper/print cartridges	-	£50
Survey time	1000 hrs	350 hrs
Management time	250 hrs	325 hrs

There is a higher management overhead per working area with the paper-based area due to the need to manually geolocate new units using the desktop GIS. However there is a higher management setup cost with the PDA method due to the time needed to resolve technical issues and time spent training survey staff.

5. Customisation

The main GIS software used by CSRS is ArcGIS from ESRI (originally Environmental Systems Research Institute). This represents point data (*i.e.* something with a geographic location but no dimensions such as a retail unit location) within its software in a form known as a 'shapefile'. The location of each point is held implicitly within the software. However for handling outside of ArcGIS a more explicit method of recording the location of each unit was

required. This was in the form of an explicit British National Grid reference given in X and Y co-ordinates.

The CSRS ArcGIS installation has been customised through the use of a freeware computer script obtained from the ESRI web site. This allows the tagging of all point data with its X, Y co-ordinates before the data is exported. Once exported the surveyors are able to carry out data entry and correction using Excel. The data is then ready for importing back into ArcGIS. Those units which are completely new require locating manually within ArcGIS and their information entering.

Some analytical customisation of ArcGIS using freeware scripts was also attempted to allow certain types of point pattern analysis (PPA) to be carried out. These permitted a small number of spatial distribution (centrographic) statistics such as the mean centre and standard distance to be calculated.

However it was found easier to handle extensive PPA outwith ArcGIS using the CrimeStat program⁴. This is a Windows-based stand-alone spatial statistics program for the analysis of crime incident locations. It offers an extensive range of spatial description and spatial modelling statistics for point pattern data.

6. Analysis

It was decided early into the project to store the retail provision data explicitly as a vector (*i.e.* with X and Y co-ordinates) in a point based format. The benefits of this are that it is a conceptually simple format to handle and manipulate and would allow envisaged analysis such as adjacencies and clustering.

One alternative would be to store each unit as a polygon thereby giving a real scaled down representation of the unit within the GIS. This is of most benefit when working at a very large scale, such as a shopping centre, and the relative size, shape and position of retail units is important.

Another alternative being considered is to use a raster data model. This works by dividing an area into rows and columns, which form a regular grid structure. Each cell must be rectangular in shape, although not necessarily square. Each cell within this matrix contains an attribute value as well as location co-ordinates. The spatial location of each cell is implicitly contained within the ordering of the matrix, unlike the vector structure which stores topology explicitly.

The advantages of the raster format are that a lot of analytical techniques have been developed to utilise it. For example spatial interpolation can be carried out straightforwardly within ArcGIS using raster data.

7. Preliminary Results

This section gives an overview of the data collected during the 2003 survey. Subsequent papers will explore the results of the 2003 and 2004 surveys more extensively. In all 6698 units were identified during the 2003 survey. The breakdown of these across retail groupings and types is shown in the following Tables. Appendix 1 describes the composition of the types and groups used.

Retail Group	Count	Percent	No. of Types	Mean Unit Count per Type
Convenience	791	11.8	9	88

⁴ This software is freely available for research purposes at <http://www.icpsr.umich.edu/NACJD/crimestat.html>

Comparison	1889	28.2	29	65
Service	2916	43.5	30	97
Vacant	623	9.3	3	208
Other	479	7.2	5	96
Total	6698	100	76	88

In Table 3 the mean unit count per type is a very rough indicator of the level of heterogeneity that is captured by the classification used. There is a slight over classification of Comparison stores, and a slight under classification of Service units compared with the overall average. The reality of retailing is such that it could be argued there is more heterogeneity present normally in some sectors than in others. Indeed as retail marketing develops perceptions of this heterogeneity can be expected to increase.

Table 4: Distribution of Convenience Retail Types		
Mean Type Count = 88		
Convenience Type	Count	Percent
Large General Food Stores - 11	62	7.8
Small General Food Stores - 12	209	26.4
Small Specialist Food Stores - 13	46	5.8
Butchers & Poulterers - 14	38	4.8
Fishmongers - 15	23	2.9
Greengrocers - 16	28	3.5
Bakers - 17	71	9.0
Newsagents - 21	233	29.5
Off Licenses - 22	81	10.2
Total	791	100

In Table 4 the small count values for Fishmongers and Greengrocers could indicate they should be amalgamated into larger typings. This is difficult to justify for meaningful analysis. Comparing the distribution of butchers a high degree of clustering could indicate a high degree of competition. If fishmongers were incorporated then it would be difficult to assess the degree of competition compared with the degree of complementarity within the overall level of clustering.

A more valid approach is to recognise that fish and fresh produce retailing now is infrequently carried out through standalone operations. In analysing the distribution of fish and fresh produce retailing account needs to be taken of such

retailing within larger operations, e.g. supermarkets. Different data structures require to be developed to cater for different needs. That is there should be a data structure for analysing retail provision and another structure to represent retail organisation.

Table 5: Distribution of Comparison Retail Types		
Mean Type Count = 65		
Comparison Type	Count	Percent
Gents Clothing - 31	38	2.0
Ladies Clothing - 32	178	9.4
General Clothing - 33	128	6.8
Footwear - 34	38	2.0
Leather Goods - 35	11	0.6
Childrens Clothing - 36	17	0.9
Sports Clothing & Equipment - 37	39	2.1
Soft Furnishings - 41	38	2.0
Floor Coverings - 42	35	1.9
Furniture - 43	139	7.4
Electrical & Musical - 44	143	7.6
Hardware & Ornamental - 45	27	1.4
D.I.Y. - 46	51	2.7
Phones & Accessories - 47	38	2.0
Souvenirs & Gifts - 48	103	5.4
Health, Beauty & Cosmetics - 50	45	2.4
Dispensing Chemists - 510	94	5.0
Opticians - 511	44	2.3
Books - 52	105	5.6
Photographic & Optical - 53	35	1.9
Bicycles & Prams - 54	19	1.0
Jewellery - 55	83	4.4
Leisure & Recreational - 56	126	6.7
Florists & Gardening - 57	56	3.0
Pets & Pet Supplies - 58	25	1.3
Large Mixed Durable - 61	16	0.8
Other Mixed Durable - 62	35	1.9
Antiques/Auction/Fine Art - 66	96	5.1
Charity Shops - 70	87	4.6
Total	1889	100

In Table 5 the small counts for Leather Goods and Childrens could indicate benefit in merging with another clothing type – General Clothing being the leading candidate. The Large Mixed Durable type also has a small count but given their (e.g. department stores) large average size then it is valid this type remains separate. Bicycles & Prams may require merging too.

Table 6: Distribution of Service Retail Types		
Mean Type Count = 97		
Service Type	Count	Percent
Video Hire - 71	43	1.5
Repairs - 72	66	2.3
Tool Hire - 73	8	0.3
Wholesale Activities - 100	15	0.5
Banks - 111	101	3.5
Other Financial Activities - 112	75	2.6
Building Societies - 113	13	0.4
Estate Agents - 114	87	3.0
Travel Agents - 115	77	2.6
Betting Shops - 116	96	3.3
Dry Cleaners - 117	30	1.0
Undertakers - 118	18	0.6
Photographic studios - 119	9	0.3
Launderettes - 121	19	0.7
Ladies & mixed hairdressing - 122	277	9.5
Barbers - 1221	46	1.6
Beauty services - 1222	87	3.0
Fitness & active leisure - 123	19	0.7
Other personal services - 124	25	0.9
Furniture removal - 125	5	0.2
Booking agencies - 127	1	0.0
Post offices - 131	69	2.4
Restaurants - 140	336	11.5
Convenience served food - 141	690	23.7
Amusement centres - 142	35	1.2
Public houses - 144	442	15.2
Car sales - 151	63	2.2
Car accessories - 152	114	3.9
Petrol stations - 153	38	1.3
Car hire - 155	12	0.4
Total	2916	100.0

In Table 6 the distribution of service retail types shows a higher degree of variation in type sizes compared with the Convenience and Comparison sectors; at the same time the average type size is higher than those sectors as well. As indicated above this can be partly viewed as a natural phenomenon. The small sizes of many of the types in Table 6 leads to difficulties in analysis – many of these types could be justifiably merged. For example Building Societies with a count of only 13 would sit well with Banks.

At the other end of the scale Convenience Served Food occupies almost a quarter of the sector by number. Given the significance of the planning use class distinction between hot and cold food takeaway then there may be a case for splitting type 141 by this criterion⁵.

Vacant Type	Count	Percent
Formerly occupied - 160	602	96.6
Under conversion - 165	21	3.4
New build - 200	0	0
Total	623	

Table 7 would indicate that there was a coding error at some stage of data collection in that no newly built vacant units were surveyed.

Other Type	Count	Percent
Unknown - 0	12	2.5
Trades & Crafts - 120	137	28.6
Medical - 126	10	2.1
Prof & business -132	233	48.6
Community - 133	87	18.2
Total	479	

As the known types in Table 8 were explicitly not a part of the survey the numbers recorded will be significantly below the real figures. This data has been collected as a by-product of the main survey to aid in mapping retail districts.

⁵ See The Town and Country Planning (Use Classes) (Scotland) Order 1997 for further information.

8. Conclusion

The 2004 survey is identifying changes in retail activity including the presence of new shops. There are also a number of units being added to the database that were missed from the 2003 survey. This is to be expected as the survey process is improved especially with regards to developing effective survey areas.

The type-of-goods classification used is effective for data capture but is somewhat subjective in its composition. There are a number of adjustments that could be made to improve its usefulness - especially to remove very small types to allow more meaningful analysis. Multi-dimensional cluster analysis may offer a less subjective method to arrive at a representative retail classification. Account also should be taken of the analysis need for which the classification is being developed. Different data structures require to be developed to cater for different needs. There should be one data structure for analysing retail provision and another structure to represent retail organisation.

Surveying using handheld PCs or paper-based methods is time consuming – both for surveyors on the ground but also for management of the data. At this scale of operation, for re-surveying units, the paper-based method was found to be considerably more cost-effective.

ArcGIS offers some point pattern analytical capabilities but it has been found more convenient to export data for reporting and analysis within Excel and CrimeStat.

Subsequent working papers will examine and analyse in more detail the data collected from both the 2003 and the 2004 surveys.