Chapter 5. British Landvaluescape Demonstrations

This chapter contrasts attempts to create Value Maps **of** Britain with recent experience using equivalent overseas datasets **in** Britain, for demonstrating the Landvaluescape concept to the Delphi Group and others. As explained in chapter two (pp.22-3) prior to this study there appear to have been no serious attempts in this country to apply modern computing technology specifically to the modelling of land and property values on a national scale. Such efforts as have been made are local or regional initiatives, somewhat hampered by lack of support from national PSIH.

The chapter begins with a description of the ideal, in terms of data content, towards which this research aspired, as evidenced by what is actually achieved in Lucas County Ohio. The origins and purpose of Lucas County's Auditor's Real Estate Information System (AREIS) dataset are examined in the next chapter's section on USA (pp.215-225) and have been touched on the chapter two (p.51). Here it is the reaction of British audiences to demonstration map graphics using AREIS, produced under the direction of the author, which is outlined. The practical difficulties experienced by British researchers in replicating such datasets and graphics, especially in the Oxfordshire LVT study (Godden *et al*, 2005) for which the author acted as Researcher, are then described.

Attention is paid to the institutional issues, since the technical aspects of manipulating the data are universal and less problematic. Finally the lessons for future studies are set out. A more extensive treatment of the subject is contained in a working paper written in 2005 for Lincoln Institute, as a condition of the Institute's support for this study (Vickers, 2006), also in earlier papers for Lincoln (Vickers 2002b & 2003, McGill and Plimmer, 2004).

5.1 Demonstrating other landvaluescapes

Howes (1980:83) surmised that future availability of digital map data and computerised rating lists would help value maps to be more widely used. However he saw them then as viable only for limited areas, such as redevelopment projects or urban capacity studies. In such cases, the map graphics produced were integral to those projects and designed specifically for them, not as a means of promoting wider uses of value maps. However chapter two (pp.19-21) summarises evidence uncovered by Howes of value maps used by public bodies in other countries in support of tax administration and spatial planning, even before computers were widely used.

Howes also noted that several academics and custodians of such maps understood their potential for demonstrating to a wider public how property markets work, how property taxes interact with those markets and also how value maps could help make both markets and taxes work better. However he could find no examples of such uses in the UK and only in Denmark was value mapping already, according to Howes (1980:68), done partly “to enable the public to be assured that the [tax] system is equitable”. Implicit in this use of Value Maps was a desire to achieve transparency in tax assessments through a shared understanding of what Howes called “the dynamics of land values”. Howes pointed to then ongoing studies in the USA in particular, which are described further in chapter two (pp.22,65) taking them up to the present day (Batt, 2001, 2002, 2008), of how value maps might be used to inform public debates over (*inter alia)* property tax reform. But in general he found that uses were confined to supporting government functions and that the users were almost entirely the same people who created the value maps: they were not designed for public use or for demonstration purposes.

The AREIS ‘model of models’ revealed

The AREIS dataset was developed largely through support from the Lincoln Institute of Land Policy (Ward *et al,* 2002), which focuses on land taxation and spatial planning and had brought it to the attention of this researcher. No comparably rich and regularly maintained dataset of land and property values has since been found anywhere that is available free to researchers worldwide. Hence AREIS data has been used for this research.

The data was first obtained by the author in late 2000 explicitly to enable the Landvaluescape concept to be demonstrated to a British audience, in the second of three Fellowship studies commissioned by Lincoln Institute (Vickers, 2002b).

In the first of these studies, it had been concluded from postal surveys of British valuers, small businesses and GIS professionals (Vickers, 2000b:51) that “Land Value Maps ought to be part of a National Land Information Service (NLIS)”. During the second Lincoln Fellowship in 2001, AREIS was demonstrated to a variety of audiences and used to produce a ‘show card’ for a question on the subject of Value Maps (identical to that in the 2000 survey) in interviews with property taxpayer business representatives. Lincoln Institute’s Research Director specifically asked for more work to be done during the author’s third Fellowship on developing a Tax Effect Demonstrator (TED), so that during 2002 AREIS was again used as a demonstration tool, in a video and slide presentations to city centre renewal stakeholders (Vickers, 2003).

One of the Delphi Group had conducted the 2001 interviews and she reported that the show cards created “a high level of interest” in Value Maps and helped interviewees to understand the concept of Landvaluescape (Vickers, 2002b:58). This confirms what Howes (1980:58) had written of value maps used in the 1960s by Melbourne’s Metropolitan Board of Works: “One of their main advantages is their almost instant impact compared with tabulated data”.

Mark Thurstain-Goodwin, the specialist geospatial data analyst employed during the author’s Lincoln Fellowship studies to prepare the map graphics, told his audience at a conference to discuss LVT for local government (Thurstain-Goodwin, 2004) that he found the AREIS data of Toledo possessed “incredibly rich attribution” compared to what he was used to being able to produce from UK property market data. The products of Thurstain-Goodwin’s earlier AREIS work remained available in this study, to be used in the event of British datasets being inadequate. These included both choropleth maps of individual land parcels in downtown Toledo (the main city in Lucas County) and also a range of different graphics showing the smoothed land values ‘response surface’ in conjunction with combinations of aerial photography, transport network and other data supplied with AREIS (see pp.236-8).

AREIS' impact on the Property Market

Using a longitudinal series of AREIS data, Thurstain-Goodwin (2004) has shown how the launch of AREIS as a publicly available Value Map facility in 2000 preceded a very significant improvement in "housing market predictability" (see Figure 5/1 below). Without access to the 'official' land and building values in mapped form buyers and sellers have very different ideas of what the 'right' price might be for a particular property. When this information held by the government is shared with market players it seems to be accepted more readily by both parties. Today's prices of properties are affected by the extent to which information about past comparable prices – converted to values and presented in map form – is made available.

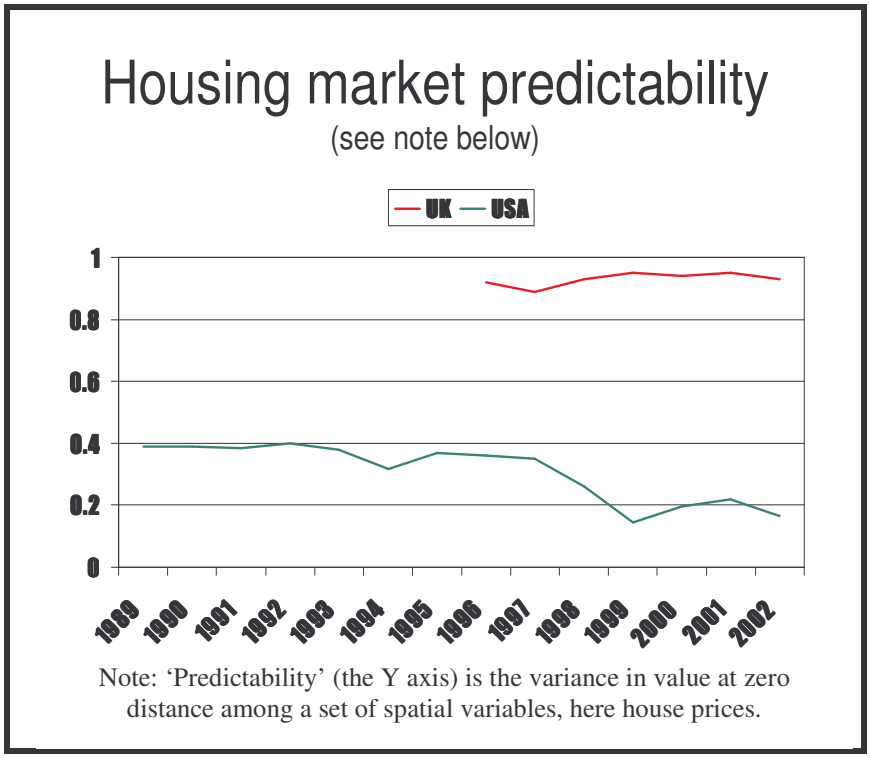


Figure 5/1: impact of value maps on housing market
Source: Thurstain-Goodwin (2004:15)

AREIS demonstrations in the Delphi

Because of the problems experienced producing a Landvaluescape model from the Oxford LVT trial area (described below), most of the demonstration maps presented to audiences (Delphi Group and others) in this study were of AREIS data. Four events were specifically arranged for this purpose, at which feedback forms were issued to elicit audience responses (see Appendix Q).

Chapter three (p.101) explains how this feedback from non-Delphi stakeholders was to have been integrated in the latter stages of the Delphi Process, as well as why it was felt that a demonstrator dataset was needed. Apart from one event, which was organised with a commercial conference company (Waterfront) and widely publicised to discuss the Oxfordshire LVT trial, these demonstrations were arranged at only about one month's notice, in conjunction with organisations with which the researcher had links, as an adjunct to events that were already planned. This short notice was because the inability to produce Oxfordshire data from the LVT trials in time for the first, Waterfront event (16th September 2004) left a gap in the research methodology that needing filling.

The feedback from the Waterfront Conference had been insufficient to inform the Delphi Group in Round Three, as planned: only 15 out of 90 attendees completed the feedback form on Value Maps (Appx.Q:2-5). The conference was mainly about LVT and although several Delphi participants attended none completed the form. The event did not attract any members of the property professions currently active in the private sector, who were a target audience because they were under-represented in the Delphi.

Only one slide of AREIS graphics was included in the author's presentation at the Waterfront conference plenary session: this incorporated four of the examples in chapter six of this thesis (Figures 6/2-6/5 below). Thurstain-Goodwin's workshop session in the afternoon was attended by about 20 delegates and he focused on the different circumstances surrounding geodata supply for Value Maps in USA and UK in his presentation (Thurstain-Goodwin, 2004), using AREIS as an example. Although the full transcript and slides of both these presentations were brought to the attention of the Delphi Group in a 'Landvaluescape Newsletter' posted on the project website in December 2004 (Vickers, 2004), even this was too late for the Group to consider before responding to Round Three.

The report on the event produced by the author for Lincoln Institute summarised the reaction of those completing the feedback form:-

> None of those who completed this version of the feedback form were property tax experts. There was a mixed reaction to value maps. They were

> seen as being of considerable use to tax administrators and urban planners, as well as the property market in general. Specifically as regards tax, it was thought the benefits of value maps would lie in enabling better quality assessments and taxpayer understanding of the basis of assessments but not necessarily a reduction in appeals or of the cost of administration. From a group consisting mainly of self-confessed political types came the view that planning, property and tax professionals would benefit more than business in general or politicians, should value maps be developed in the U.K. Software suppliers were seen as the stakeholder group least benefiting from their development. (Vickers, 2006:18-19)

The AREIS maps were less prominent than the maps of the local LVT trial area and it is not possible to know whether the superior quality of map graphics from AREIS influenced respondents more than the limited graphics produced from British data.

The same applies to the three other events at which AREIS graphics were included in presentations by the author, listed in Appendix Q, which took place in November 2004 and January 2005. They were for a more general property professionals' audience and did not focus as much on LVT or (apart from the last event) on the Oxfordshire trial. Only 12 completed feedback forms were received from these three events in total. The responses were more mixed and included people who could see little use for Value Maps, even after seeing the AREIS graphics. However most were broadly positive.

Few practicing UK property professionals have reason to be interested in what is done overseas so long as there is little prospect of it soon affecting their own work. Inability in this research to demonstrate such a prospect for UK Value Maps was bound to dampen enthusiasm.

The remainder of this chapter deals with efforts by this researcher to produce Value Maps of Britain, with the Oxfordshire LVT Trial as a case study which in turn built on previous work in Liverpool (Vickers, 2003) and London (Mitchell and Vickers, 2004).

5.2 Problems with UK Data

The problems experienced preparing Value Maps in the Oxfordshire LVT study continue to face researchers attempting to replicate the earlier Whitstable studies of LVT in the UK (Wilks, 1964 and 1974), as described by McGill and Plimmer (2004). In essence, their cause is the lack of a UK cadastre and of a UK GI Strategy to overcome deficiencies in land information. Chapter two (pp.69-74) briefly outlines the deficiencies in the UK's fiscal cadastre. The Delphi Process exposed Group members to the causes of, if not the evidence for, current problems (their views are outlined in chapter four). This section critically analyses how the problems revealed themselves and were dealt with in this research.

Land Data Preparation in Oxfordshire

Prior to the inception of the Oxfordshire LVT Study, a consultant working with the local authorities in the county had done some work devising a way to automate the creation of 'indicative' land parcels, using OS MasterMap™ data held by the County Council and other information held generally at District level, mainly in planning departments (Black, 2003). This had been necessary because HMLR index maps, although structured as polygons, are not formatted to allow transfer to external users. Meanwhile OS does not map land ownership, but only physical features. This leaves most local authorities having to rely on a point data set, their Local Land and Property Gazetteer (LLPG), for all referencing of land parcels. However LLPGs are designed merely to reference occupiers of property, not owners.

For internal use and in dealings with other agencies in Local Strategic Partnership (LSP) work, Oxfordshire local authorities had already accepted the need to rationalise their land and property referencing systems and move to a polygon-based system. This was confirmed as a general trend in a recent study of land use data in England (Sayce *et al*, 2008). In Oxfordshire, at officer level the authorities were pleased to have a reason, supplied by the local politicians who set up the LVT trial, to devise a way of ensuring their LLPGs provided full coverage and were polygonised. With a point dataset and no corresponding polygons, it is impossible to ensure that complete coverage of an area has been achieved or to deploy point-in-polygon techniques to depict attributes of land parcels or properties, such as their value. This is illustrated by Figure 5/2.

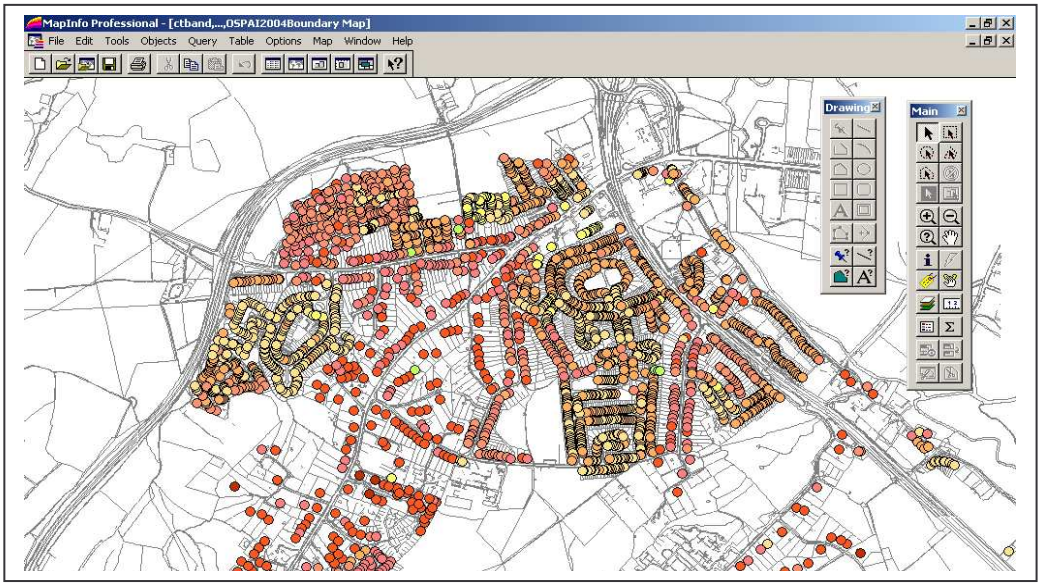


Figure 5/2: Oxfordshire LVT Trial Property Tax Records

Figure 5/2 shows part of the trial area, with records in the council tax (CT) database marked by coloured 'pins'. It is impossible to pick out properties that have no tax record and difficult to make out proportions of the area in different CT bands. However the automated land parcel formation routine was only 60% effective: the remaining 40% of parcels had to be formed manually by inspecting other maps and records or by visiting the sites (see Figure 5/3).

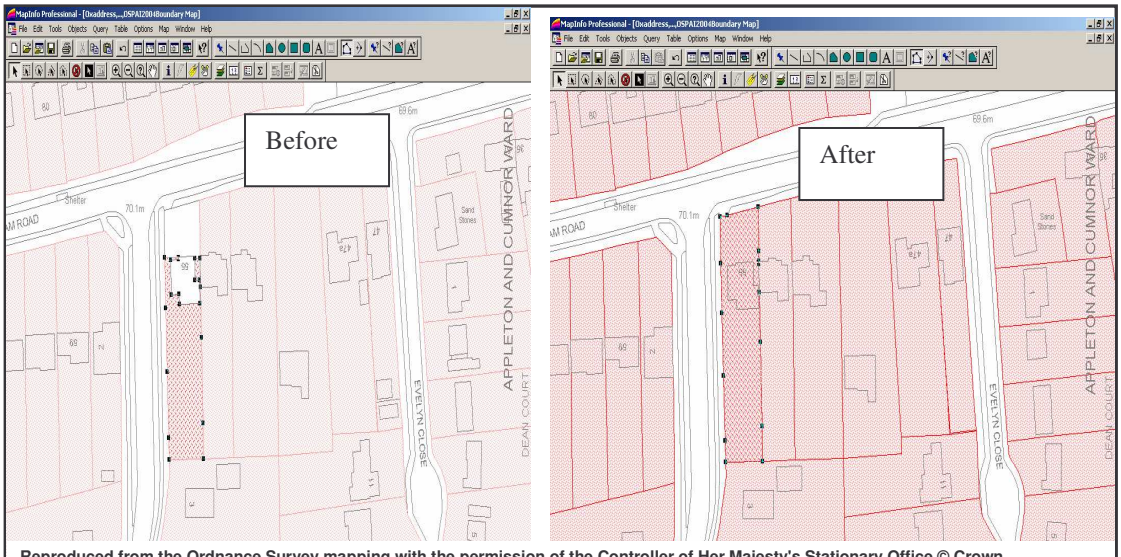


Figure 5/3: Manual Polygon Formation for Oxfordshire LVT Trial

Land parcel formed manually: rear garden plus building plus 'missing' front garden.

It was not – and still is not - a statutory requirement to have polygon data for land and property records. The District Council which hosted the LVT study, Vale of White Horse (VoWH), never secured sufficient resources to complete

the manual polygon formation task within the timescale originally set by their project steering group. Nor was it achieved in time to use in this research. Temporary staff were employed by VoWH during 2003 to complete the vast majority of land parcels but a small number of ‘slivers’ of land (about one percent) still remained undefined when the project was wound up upon change of County Council control in May 2005. The VoWH GIS Officer described the councils’ approach to the task in Godden *et al* (2005:4-6).

The District Council’s IT Department was never authorised to carry out Landvaluescape 3D-modeling work because their directive was merely to consider options for property tax reform. Completing the land parcel coverage may have been important for the LSP and council planners but it never featured as a requirement in the LVT study. They possessed no 3D modelling capability, hence such work for this study had to be done with University resources.

In return for acting as the LVT Trial steering group’s research adviser, the author was allowed to use the data from the trial in his research. A contract was procured involving the Kingston University Landvaluescape research team, VoWH District Council as owners of the land data, Rapleys Property Consultants (employers of the professional valuer who prepared the site valuations) and Lincoln Institute as sponsors of the valuation. The Institute’s main interest was very similar to that of the research team, i.e. to explore the potential use of Value Maps in property tax and market operations. However at the time this contract was signed, it was not realised that the underlying land parcel polygon dataset was incomplete. There was no provision made in this contract for work to ensure that the dataset could be completed. The Lincoln Institute funding was purely to obtain land valuations for records in the dataset.

Tax Effect Modelling

The type of Value Map which the Oxfordshire LVT study concentrated on producing was similar to that used in the earlier Liverpool research. It was however designed for a very specific purpose: to demonstrate the effect on taxpayers (owners or occupiers of property) of possible changes in the property tax system. It required the Revenue Section of the local tax billing authority (here VoWH) to match their business rate and council tax records against the polygons created by the GIS team using the LLPG.

This data matching was itself made easier by having a graphic interface through the computer mapping system. The field used to link the two datasets was postal address. However a peculiarity of the British property tax system is that no tax is imposed on non-residential, non-business properties, hence no tax records exist for most rural and undeveloped urban parcels. This resulted in there being many 'orphan' land parcel records in the LVT Trial dataset, with no corresponding tax records, even though it was possible for the valuer to produce valuations for them. On the other hand, multi-occupation properties in Britain contain a tax record for each hereditament (taxable property unit), hence there were some land parcels which had more than one corresponding tax record. In jurisdictions with LVT, the tax record **is** the land parcel (see chapter six), so this does not occur.

Like most councils, VoWH relies largely on OS AddressPoint™, which uses the Royal Mail Postal Address File (PAF) addresses and their geocodes for referencing. PAF is far from ideal for referencing land parcels through 'point-in-polygon' GIS routines, because the digitised point is not the parcel's mathematical centroid but the letterbox, which is what Royal Mail is interested in. This is often at the boundary of the land parcel, so a slight error in digitising can put it outside the relevant polygon. Some commercial properties may not have a letterbox, hence may not have a postal address or a record in AddressPoint. OS has since improved the Address layer in MasterMap™ to overcome the latter problem of (in postal terms) 'non-addressable' properties but this product was not available to the research team at the time.

Notwithstanding the above problems that are peculiar to Britain, the vast majority of taxable properties were correctly identified and therefore their taxable values under both the current and proposed (LVT) tax systems could be used to graphically represent absolute or relative values and tax liabilities per parcel. Figure 5/4 gives two examples of tax effect (TED) chloropleth maps used by the LVT Working Group in their report to the County and District Council (Godden *et al*, 2005:21).

In preparing for the task, the valuer visited Bridgeport, CT, USA to learn how valuers there obtain separate assessments for land and buildings. The values assigned to land parcels by him were based on market evidence supplied by local property agents and an assessment of the impact of the Local

Development Plan, from discussions with VoWH planning officers. His report on the methodology adopted for the trial and his experience in it (Rapleys, 2005) was summarised in his own words in the Councils' report on the LVT Trial (Godden *et al*, 2005:7-10). Of significance to this research are his comments in the councils' report that access to the local authorities' planning officers, to the District Valuer (for transactional evidence) and to OS map data (via the LAs' GIS) are crucial to make the valuer's task possible. He concludes:-

> ...a relatively straightforward exercise could be applied country-wide, without the need for substantial increase in resource....each subsequent exercise [in revaluation] should be ... no more (and, arguably, less) cumbersome than either the Non Domestic Rating Revaluations or the Council Tax Revaluations. (Godden *et al*, 2005:9-10)

The VoWH database for the LVT trial was held and processed in Mapinfo proprietary format and MSAccess. The best that VoWH could do to simulate Landvaluescape was to use site values to generate 'extruded' land parcels in the trial area and then view them orthogonally (see Figure 5/5) with greyscale shading of 'shadow' side. Although quite effective at first sight – showing how values tend to be higher towards the north-east (top) and grade off towards the farmland (bottom left) – the Mapinfo software does not allow smoothing or contouring and gives undue emphasis to small high-value sites.

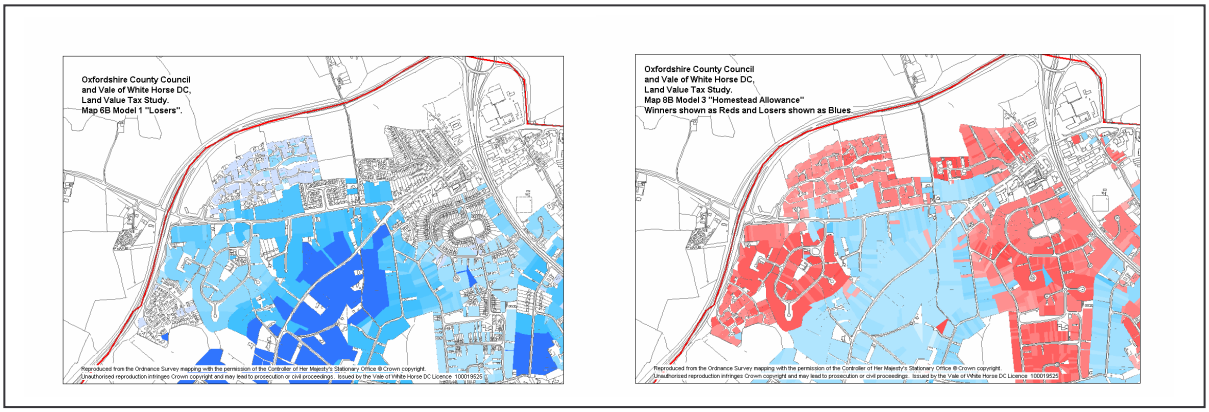


Figure 5/4 – Tax Effect Demonstrator Maps of part of Oxfordshire LVT Trial Area

Source: Godden *et al* (2005:21)

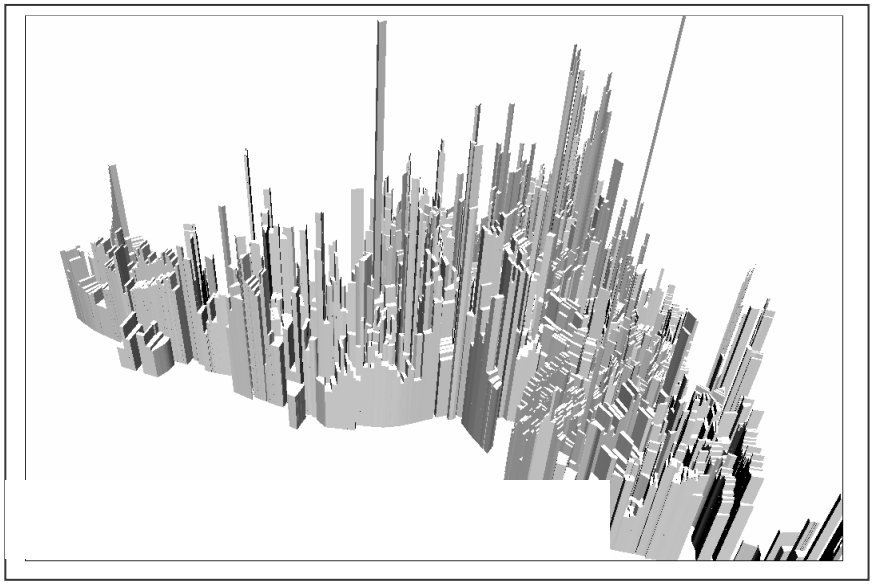


Figure 5/5 – Vale of White Horse DC 3D-simulation of Landvaluescape for LVT Trial Area: vertical 'extruded blocks'

Source: Vickers (2006:15)

Kingston University uses ArcView software from ESRI. VoWH were able, under the contract, to transfer the database files to Kingston. A GIS-trained research assistant at the university worked on the initial set of incomplete data received in July 2004 but was redeployed before most of the missing parcel records were received in November. Although a complete set of land parcels with site values was never completed for the trial area, some 3D graphics of the later VoWH data were eventually produced by another GIS research assistant David Holloway, still with some 200 missing parcels or parcels with null values. The University's ArcView software extension product 3D-Analyst was used. This incorporates two standard smoothing algorithms: Inverse Distance Weighting

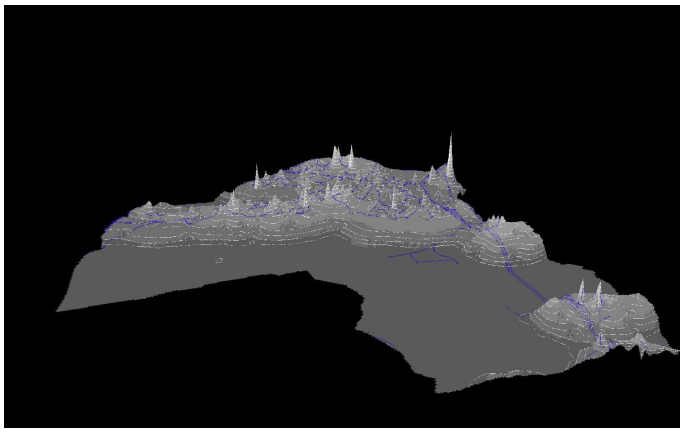
(IDW) and kriging (see chapter two, p.64). However by the time the graphics were available, the planned demonstration events had taken place. In an Appendix to the report on the trial for Lincoln, the research assistant explained how records with a null value are treated in 3D-Analyst:-

> …the IDW algorithm uses points with a known site value to estimate the unknown site value of other points within the study area. Therefore any point without a value will be assigned a value based upon the nearest points with a known value. Therefore where the values are restricted to just the residential sites the algorithm will estimate all other points to a distance thus creating the shadowy effect around the surface (Vickers, 2006:31).

Figure 5/6 shows the trial area viewed from a similar aspect as Figure 5/5 but with smoothed land value 'response surface' after applying IDW and extending values by inference out to the edge of the model. It also wraps the road features over the surface, to give some referencing framework: adding site boundaries as well made the graphic far too cluttered. What this shows is that smoothing of the raw data in this way obviates the risk of revealing sensitive transactional information while at the same time making the spatial pattern of land values much more apparent than is the case with chloropleth maps, let alone tabulations of the data.

With a complete dataset and the resources that would come with a 'real' application, much more useful presentation graphics could have been produced with standard software. However by this stage in the research it was clear that the focus needed to be on the reasons why land information is not more readily available, more than on the techniques for manipulating it. The feedback from the Delphi Process showed that the main issues to address in determining the validity of the hypothesis were relating to data availability and not data analysis and display. The software is extremely flexible and the techniques have been developed in other parts of the world which allow a wide range of uses, including value modelling (see chapter two, pp.53-63).

Figure 5/6 – Smoothed Land-value Response Surface for LVT Trial Area
source: (Holloway, 2005a)



Landvaluescape modelling with small-scale 'value' data

While waiting for the LVT trial data, Holloway was asked to practice his skills and develop possible graphics to demonstrate the Landvaluescape idea using other data. HGF had been publishing quarterly a 'Land Value Monitor' for England and Wales, tabulating a surrogate for average land value in local authority areas. Figures for average sale price per quarter of four types of dwelling are published free by HMLR and HGF's researcher Duncan Elliott had devised a way of accounting for regional variations in construction costs and dwelling sizes to produce a surrogate figure for average value of land per dwelling sold[1]. Elliott supplied two successive sets of this data to Holloway, who was asked to produce graphics to show the absolute values and the relative rates of change in value, both as choropleth maps and as 3D response surfaces. The results were posted on the Landvaluescape website, sent to Delphi Group members and used in presentations at events where responses from attendees were sought.

Elliott's algorithm does not account satisfactorily for the anomalous nature of housing in central London but in other respects the graphic products accord with what would be expected (see Figure 5/7). Until better sets of official figures for land values are produced and made available, this is the only kind of "Land Value Map" of England that can be made available free of charge.

[1] Elliott's algorithm was not published with Land Value Monitor, which was discontinued in 2006.

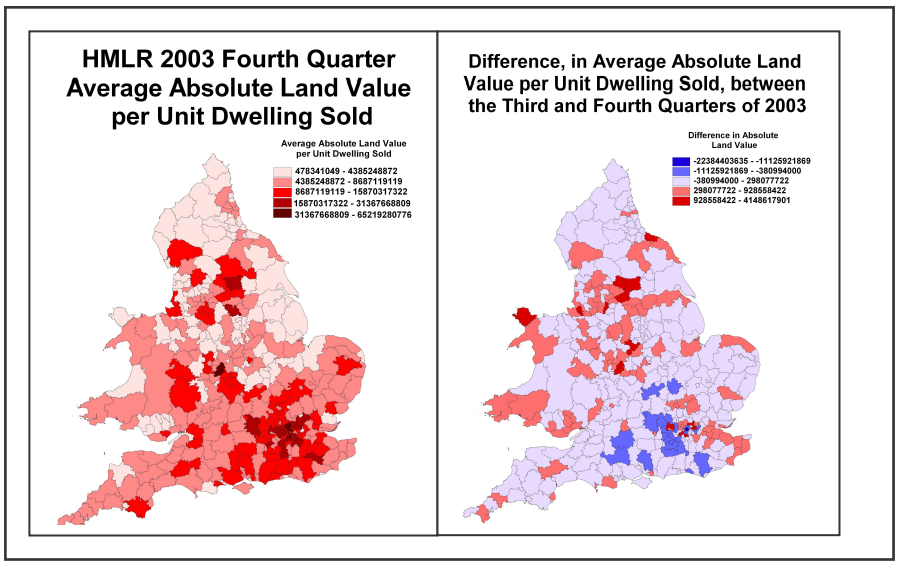


Figure 5/7 – Land Value Maps of England & Wales by Local Authority

Source: Holloway (2005b); first published in Vickers (2006,16)

5.3 Lessons for British Landvaluescape demonstrators

Whatever the scale at which Landvaluescape models are to be produced in future in Britain, it is essential first that a clear, broader set of requirements for the underlying land information is investigated. The Oxfordshire LVT Trial showed that data collected for one specific purpose (addresses for Royal Mail, ownership land parcels to support transactions, property tax assessments for five- or ten-year revaluations) will remain of limited potential use to other applications. In many cases, the limitations of existing datasets are legal as well as technical. There is no remit placed upon data custodians in the public sector to share data that is needed for Value Mapping, even though data sharing has been a stated priority of Government for some years (Information Society Initiative, 1996; Cabinet Office, 2006).

Without Government direction, these agencies will remain unable to justify even research into transformation of their data definitions and processes which might lead to wider public benefits. The Trial proved what McGill and Plimmer (2004) had concluded: that PSIHs are unable to exercise discretion to supply data in support of academic studies which do not support their own business plans.

In particular, the current absolute legal barrier to sharing property transaction based information must be removed to some degree, so that ‘fine-grained’ – if not single-parcel – land value information can be placed in the public domain. Unless this happens, there is almost no possibility of further academic research towards similar aims as this, using British property data.

To preserve a reasonable degree of data privacy, it is necessary to distinguish between raw transaction data and collections of anonymised data, which could be passed from a trusted source (such as VOA or HMLR) to other users for wider purposes. There are few if any applications for Value Maps (other than at very small scale such as the Land Value Monitor of HGF) which would make them worth the effort of producing until these legal barriers are removed. Without the support of statutory authorities responsible for the custodianship of national datasets needed for assembling land values, the problems experienced using the Oxfordshire LVT Trial will be repeated.

The next chapter describes how selected overseas jurisdictions do this. The final chapter makes certain recommendations for legislative action in the area of

information policy, as well as for technical changes to standards and procedures for handling land and property information.