Chapter 6 – Selected Overseas Comparisons

6.1 Basis for selection

Value Mapping, as defined in chapter two by Howes (1980), is practiced in many countries. However there are no official surveys on the subject. A global pilot survey carried out while the subject of this doctoral thesis was being considered indicated that many more countries believed it would be useful than were currently practicing it (Appx.K:4).

For this research, the definition of a Value Map at the start of the Delphi was “a representation of Landvaluescape” (Appx.E:7), later refined, for the non-Delphi participants:-

> any map that shows the variations in land or property values, where data are derived from market transactions and/or professional assessments made for taxation purposes in accordance with local statute (Appx.Q:2).

However a slightly different definition was used in the earlier letter (Appendix L) sent to overseas experts before this research “to establish the extent to which value maps – maps showing the value of land and property - are being used around the world today”, which was: “any map that shows the way any measure of land or property values vary [*sic*] over space and/or time”. This letter was sent to representatives of over 70 nations belonging to FIG (Commissions 3,7,8, & 9). These were leading property professionals, respectively involved in Spatial Information Management, Cadastre and Land Management, Spatial Planning and Development, and Valuation and Management of Real Estate (FIG, 2008). The implication of using the FIG address list was that responses would represent a national view.

Several countries were provisionally selected for further investigation even before the first FIG survey in January 2002, based on prior knowledge of their status, obtained from the literature and research contacts in each: Australia, Denmark and the United States. To these were added Lithuania and Sweden after the second FIG surveys in 2004. The following factors were taken into account in drawing up this list:-

1. **Variety of cultural and economic history**. Although some countries with a similar level of economic development as the UK were needed to

be true comparators, it was thought that a country experiencing a major economic, political and cultural transformation such as Lithuania would be of considerable interest. Rapid progress towards creation of a modern property market in a former communist state was expected to be associated with interest in non-tax uses for value maps.

2. **Common language**. For ease of research and communication, countries where English was native or commonly spoken were preferred.
3. **Long experience of use of Value Maps**. The longest period of practical statutory application of such maps, even before the computer age, was known to be in Denmark.
4. **Shared land law roots**. To a limited extent, Australia and USA share such roots through their history. Newer Commonwealth countries have less advanced economies, hence less in common with Britain in other respects.
5. **Active modernisation** of GI and/or tax systems. Many of the above countries were known to be actively undergoing change in their systems, thus offering recent documented reasoning behind such change.
6. **Positive attitude towards sharing research information**. A response to one or both the FIG surveys was a good sign that further information would be forthcoming.

Up until this doctoral research topic was registered, it had been hoped that the overseas fact-finding ‘strand’ would play a more prominent part in the overall methodology. Initially it was intended to undertake an extended (up to six month) visit to Australia and make the major theme of this research a comparison of attitudes towards Value Mapping in Britain and Australia. However lack of funding for such a visit meant that only shorter visits, to those countries in the above list that were nearer to Britain, would be possible. The disappointing response to the 2004 FIG survey meant that no quantitative results – and little qualitative data – from overseas was available in time to contribute to the Delphi Process. The delay between completion of the Delphi and completion of this thesis was largely caused by the need to carry out more extensive overseas research in the subsequent period.

Overseas visits by the author from which information was obtained for this research were made as follows:

Denmark: February 2001, November 2005

United States: March 2001, April 2002

Lithuania: October 2004

Sweden: October 2005

The aim of those visits that took place after the Delphi Process was begun was to establish what cultural, political and economic conditions had influenced the development of value mapping and geospatial infrastructure more generally in these countries and how they were being used – now, in the past and possibly in the future.

Other main sources (see bibliography) were:

- official and academic websites;
- international conferences in the Global Environmental Taxation Conference (GETC) series and FIG XXI-XXIII Congresses attended by the author;
- the FIG surveys undertaken specifically for this research;
- Andelson (2001) on LVT around the world; and
- email exchanges with experts contacted via all the above.

6.2 Global Overview

Value Mapping is becoming common globally under the definition used here. Whilst the respondents to the FIG surveys are a self-selecting sample from countries that may not be representative even of the developed or rapidly developing economies, Table 6/1 summarises selected facts taken from their responses to the earlier survey in January 2002 (Appx.K:4,12-15), referred to hereafter as “the pilot FIG survey”. It provides indicative, rather than quantitative, evidence of the status and perceptions then of value mapping globally.

The 18 respondents came from 16 countries and most were valuation or land management professionals. Some asked for their names and/or that of their country not to be revealed. The information in Table 6/1 is only part of what was obtained from this survey. Britain is shown at the bottom, for comparison. The first column after ‘country’ gives the largest scale of surveyed map available nation-wide in computer-readable ‘digital’ form. Next is shown with ‘Y’ where land values are assessed, for tax purposes, separately from gross property values. The use of computer-aided mass assessment in property taxation is indicated by “Y” under the column “CAMA”. The next three columns show whether there was then (in 2001) public access to cadastral maps, property transaction prices and property tax information.

The final column “NLIS planned uses” shows abbreviated answers to the question “Please give any uses that you know of to which land and geographic information systems (LIS/GIS) are being put in your country”, which encouraged respondents to give details of planned or “developing” uses as well as those already implemented. Where a country row is shaded, it denotes that the respondent expressed the **opinion** that value maps would **not** be useful in that country “for the foreseeable future”. The 2001/2 questionnaire did not ask **factual** questions about the use of value maps, as it was the intention to establish the extent of use of CAMA and GIS as likely key “components in the future development of value maps” (Appx.L:1). A ‘full’ FIG survey on Value Maps was to follow during the Delphi Process.

There is some correlation between the existence of large-scale digital mapping, use of CAMA and public access to cadastral and tax information. The Austrian

respondent cited 'cost' as the reason why value maps would probably not be used. Norway does not have any "direct tax on land or real estate": property tax is invariably associated with value maps, so this could explain the answer. All other respondents thought that value maps would soon be used, which accords with the facts on availability of map data, cadastres and property taxes. Some respondents explicitly mentioned value maps among "planned uses" of national LIS.

Country (*italics* indicates respondent requested anonymity)	**largest digital map 1:x**	**Separ't land valu'n**	**CAMA**	**Public access to**			**NLIS planned uses**
				Cad'l map	**Price paid**	**Tax values**	
Norway	500	N	N	Y	Y	List	Many
USA/Michigan	Varies	N	Y	Y	Y	?	Unspecified
S American state	10,000	Y	?	Y	Y	List	Developing
Netherlands	1,000	N	Y	Y	Y	N	Several
Australian state	500	Y	Y	Y	Y	N	Inc. val. Maps
WEur. small state	500	N	N	Y	N	N	Developing
USA western state	Varies	Y	Y	Y	Y	List/ map insp.	Many
Finland	500	Y	Y	Y	Y	Map insp	Many
Sweden	Referred to website, clearly under development						
Baltic state	500	Y	Y	Y	Y	List	Developing
Cyprus	50,000	N	dev	L'td	Y	List	Developing
Denmark	1,000	Y	Y	Y	Y	List +w	Many
Hong Kong	1,000	Y	Y	Y	Y	N	Many inc. private sector
Austria	200	Y	?	Y	Y		Land use
New Zealand	?	Y	Y	Y	Y	List +w	
France	500	Y	Y	Y	?	List +w	Developing
Britain	1250/ 2500	N	N	-	Y	List	conveyancing

Table 6/1: FIG Pilot Survey Responses

Source (except Britain) : the author's survey of FIG members Jan 2002 (see Appx.K:4), updated in the case of Hong Kong & NZ (now use CAMA).
Under 'Tax values': 'list' means that only the tax lists (not a map) can be inspected; 'w' means inspection of maps by internet only.

Most EU member states are likely to develop interoperability of land value datasets: the EULIS project specifically includes this in its overall scope (EULIS, 2004), although not as an early priority. A 1998 survey of 40 European

countries for the UN Economic Commission for Europe (UNECE), that stretched beyond the EU as it then was, found that 95% of them operated “systems of land valuation”, with 75% using a cadastral map. 69% of countries also had land registration systems wholly or partly computerised (Guandin and Manthorpe, 1998). The same body published a report in 2005 on “development trends” in land administration in the ECE region that defined the subject as “recording and disseminating information about the ownership, value and use of land and its associated resources” (UNECE, 2005:4). The foreword contains this statement by the UN/ECE General Secretary:-

> Policy goals cannot be achieved unless there is an effective land administration infrastructure with modern information technology providing effective citizen access to information. This infrastructure also includes organisations, standards and technological processes, as well as laws and regulations for property rights, valuation and taxation (UNECE, 2005:3).

GIS can enable “effective citizen access” to land information, provided that the data in the GIS are authoritative and up-to-date. Valuation is here stated to be integral to “effective” land information. Hence Value Maps are accepted by the UN as among the “policy goals” towards which states should be working.

There now follows an analysis of several country case studies. They are given in the order which the author first visited them for research purposes (Australia not having been visited): Denmark, United States, Lithuania, Sweden, Australia. A section on each country covers the expressed purposes behind its value mapping, the methods and designs that each features, the organisation of the property tax and value mapping systems and the costs and benefits attributable to them. A final section draws certain conclusions relating to the hypothesis, comparing the countries studied and presenting insights relevant to Britain.

6.3 Denmark

Denmark has used LVT (*grundskyld)* for over a hundred years and this "has resulted in" Value Maps (Howes, 1980:68). Denmark was visited by Hector Wilks and referred to in his first "Whitstable Study" of the rating of site values (Wilks, 1964) which, according to Howes (1980:79), included "information regarding the methodology of Danish [value] map production". A hand-coloured Danish Value Map from around 1962, allegedly obtained by Wilks, was seen in the library of HGF in London when the author worked at that organisation in 2000. Howes (1980:69-70) also included examples of manually compiled Danish Value Maps in his book on the subject.

This section was informed by a visit by the author to SKAT (*Told-og Skattestyrelsen*), the Danish national tax authority, on 31st October 2005, which happened to be the day that responsibility for property tax administration passed from local to central government. A separate report of this visit was prepared and agreed with host Bo Dalsby (Vickers, 2005b). An earlier visit by the author to Denmark, in 2001, focused on Denmark's reasons for using LVT and not particularly on Value Maps (Vickers, 2002b:55-56). The modern, computerised value map at Figure 6/1, was supplied by SKAT before the second visit.

Purpose of Danish maps

The purpose of maps like Fig.6/1 is to assist the tax authorities in defining areas with similar land prices, "to ensure quality of assessment by valuers and to enable the public to be assured that the system is equitable" (Howes, 1980:68). Howes states that Denmark used to produce them in booklet form for each tax area. Although value maps always used to be an integral part of the manually calculated system, LVT tax rates had been falling since the early 1960s. The justification for preparing labour-intensive maps to satisfy the above purpose was therefore weakening.

However Howes went on to report that others uses were made of them: "land value maps for Copenhagen have been used by the Council ... to produce a three-dimensional model of its central area" – presumably with the 'vertical' being 'value'; "Danish value maps are extensively used by local authorities when considering the future cost of acquisition for public purposes"; and

because they “are easily accessible to the public ... there is now a tendency for [the maps] to be used by credit institutions, private individuals and companies with an interest in private property” (Howes, 1980:68). Even as Howes was writing, he warned, “the Danish government is currently considering means whereby these maps may become less ‘publicly available’, whilst at the same time reassuring taxpayers as to the equity of the system”.

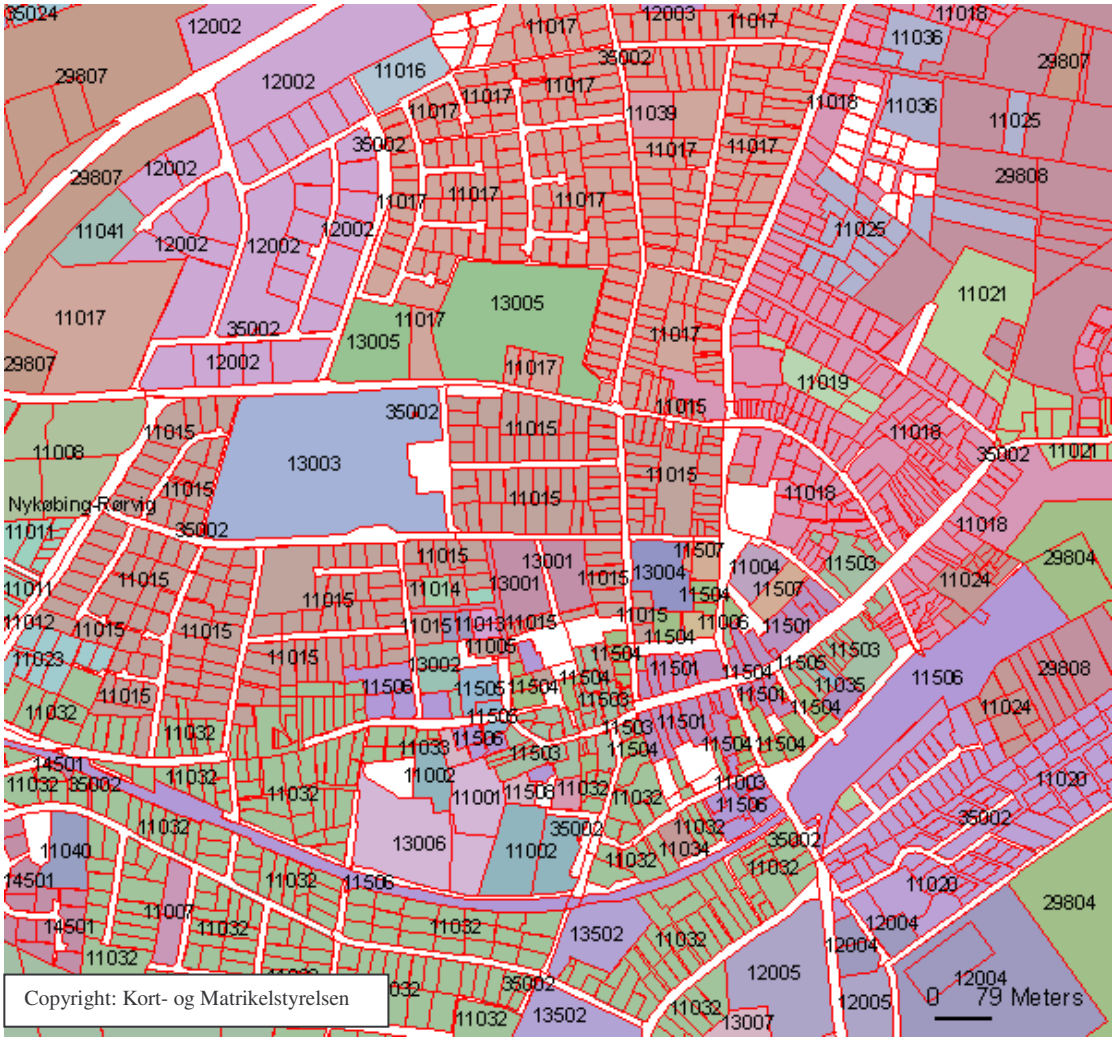

Figure 6/1: Danish Urban Land Value Map
Source: SKAT, supplied as email attachment to Dalsby (2005)

By the time Denmark moved to CAMA and annual revaluations in the 1980s (Müller, 2000), the tax rate was so low that the demand for public inspection of the maps themselves did not justify the extra work of maintaining them in the public domain. Jensen (1998) makes no mention of their use in a presentation that year about Denmark’s LVT. Therefore it was no surprise for this author to discover on his 2001 visit that, by the mid-1990s, most local authorities had ceased to maintain their value maps, relying for public dissemination upon the tradition of a property’s land value appearing against its address and phone

number in national phone books. According to Jensen (1998), the last "cadastral value map series" was prepared by manual methods in 1977 for the county land tax commission which he chaired.

GIS development followed later than CAMA, only in the last decade. Digital value maps were merely drafted as an internal and informal adjunct to tax administration until the 2005 modernisation of the system which sought, among other things, to specifically develop digital value maps as part of the on-line public access facility (Vickers, 2005b). However owing to a serious shortage of GIS specialists in SKAT, priority was initially being given to developing value maps for internal use. Investigation of other applications for the maps within government (e.g. in land use planning) was planned. However no evidence has been found of any official attempts to carry out 3D modelling from value map data.

Features of Danish value maps

In Figure 6/1, each colour denotes a value range and each number a specific land value area or zone. Thus '11015' and '11017' are similar in value but all parcels within '11015' have the same land value for tax purposes, slightly different to parcels in '11017'.

The rules require all parcels within a zone to have the same planning use (current and future). A zone's boundaries must not cross with those of land use zones, although a land **use** zone may contain several land **value** zones of different value. Parcels in a value zone need not be contiguous (e.g. zone '11504'). They must have "the same expectations of future trend in prices" also "one planning area can contain more land value areas or one land value area may contain more planning areas" (Dalsby, 2005).

It would appear that land value areas always contain at least two parcels, allowing the authorities to maintain confidentiality of any price information obtained regarding a particular parcel or property. The whole country is covered, including rural areas.

Organisation of property tax and value mapping

Apart from setting the tax rate, which is done by the counties and municipalities within bands allowed by the national government, all aspects of property tax are run by the state. The cadastral base map is the only large scale national map

and is maintained by the National Survey and Cadastre (KMS). Full digitisation was completed in 1997 and the Land Book (non-spatial register) was also fully digitised by 2000 on a separate system held by local land registry offices (Christensen, 2002).

The two systems are compatible and easily accessible to the public. Under Denmark's integrated land management system, SKAT collates property market information, defines valuation zones and maintains the valuation register in conformity with the cadastral map. The legislative basis for the systems was not investigated.

Costs and benefits

Far from adding to the cost of tax administration, map-based analysis of market values to define land value zones was said by the tax authorities to have resulted in greater accuracy and transparency in assessment, hence low appeal rates and reduced overall costs. Denmark's adoption of CAMA in the 1980s resulted in a five-fold reduction in the need for valuation staff (Müller, 2000; Jensen, 1998). However this efficiency saving was mainly used to reduce the period between revaluations from five to two years, thereby improving equity and quality of service to taxpayers.

The latest modernisation involving GIS was expected by SKAT to further reduce numbers of staff from about 400 to 150 and to enable many local offices to be closed without reducing public access to the system (Vickers, 2005b). Even before this, according to Jensen (1998) the total cost of the Danish system, before the latest modernisation and re-introduction of value maps, was only DKK 200 million per year, corresponding to about DKK 100 (£10) per property, with only 2% of all the 0.8% of assessments appealed being attributed to land valuation (as opposed to gross property valuation). In other words, less than 20 assessments in every 100,000 result in appeals against the land value element.

It is too early to say whether value maps will achieve, as the authorities expect, even higher levels of acceptance of land value assessments. There is no information on what specific benefits, in financial terms, are expected from non-tax uses of the maps – or indeed if there are any. The author did not visit representatives of any potential non-tax users of Value Maps in Denmark and

has seen no reference to such uses, other than in Howes (1980) as quoted above.

Concluding Remarks

Denmark is the only country known to have consciously used value maps before the computer age for the two main tax-related purposes found in more modern property tax systems: analysis of value zone boundaries by tax officials; and achieving transparency in assessed valuation for taxpayers. Although for a time during its relatively early modernisation process, the tax system lost the second of these uses and value maps became used only internally by the tax authorities, it has now fully restored tax transparency as one of the maps' key functions.

There is no sign as yet of value maps having wider non-tax uses, probably because their history of use purely within the tax system is so long. That system appears to have good potential for integration with other Danish LIS, which would assist more holistic business plans for value maps.

6.4 United States

Because of the federal nature of the country's constitution, the land administration and legislative systems of USA are highly diverse and devolved, compared to the UK. Counties (mainly, see Pearson, 2002; Ventura, 1998) and even municipalities administer LIS and can choose from a variety of systems under the laws of many of the states. In general, according to USA's FIG representatives' survey responses (Appx.K:4), there exist: comprehensive cadastral land records; separate assessments of building and land values; sophisticated computer-based systems for all components of LIS and property taxation; and good public access to data in those systems. At the Federal level itself, although there is a considerable amount of Federal-owned land in most states, there is little Federal legislation or geospatial information infrastructure that impacts upon LIS or Value Maps.

Federal Law relating to GI

The most significant aspect of Federal legislation in this context is the Freedom of Information Act of 1966 and its electronic equivalent of 1996, which assure public access to all federal data, "other than by exception" (Cho, 2005:72-3). Furthermore the US 'open records' regime under these acts means that data obtained by public agencies at taxpayers expense must normally be supplied free of charge. Most states have complementary laws, so that the situation in USA is diametrically opposite to that in most of the EU, where the user of data pays for the bulk of the cost of its production as well as its dissemination. Furthermore intellectual property law in the USA does not apply to public information.

"Exception" (to 'open records') can be made and sometimes is in the case of GI. Cho (2005:74-5) discusses how this arises and what effects it has, suggesting that cost recovery is becoming more common: "the tension is between a public's right to public data as against a public agency's need to fund its GI operations". However the contrast with Britain is stark. In the USA, the onus is generally on the provider to make the case for a user (even a commercial body that will profit from access) to pay for - or to be denied access to – the data that comprise Value Maps and other GI products. In Britain, the public body is normally able to charge any 'reasonable' amount and to deny access to data

unless users can demonstrate a public benefit is to be gained from sharing it and/or waiving charges.

This difference in how legislation treats PSI means that it is harder in the USA than in the UK for public bodies to justify investment in data collection and quality assurance, because there can be little or no cash return. All such investment has to be justified on the basis that what the government itself needs to do with the data is essential and of benefit to taxpayers. On the other hand, it is easier for private sector value-added resellers and application developers to grow their businesses. This makes it much easier to develop applications such as Value Mapping, in both the public and private sectors – but especially the latter.

The Federal 'open records' policy effectively means public authorities have an obligation to create digital data. Under the Federal Paperwork Reduction Act 1995, every public authority is obliged to ensure "that the public has timely and equitable access to the agency's public information" (Cho, 2002:74). Cho implies that case law has interpreted this as meaning information must be available in paperless form where possible, i.e. digitally. This would seem to encourage the publication of Value Maps online or by other electronic means.

Local property taxation

Rybeck (2000), in Andelson (2000:139-140), points out that from the earliest stages of European settlement in America, "cities, counties and states, the major government players, raised public funds almost exclusively from property taxes which, at first, were predominantly taxes on land values". Hence property tax administration has become and remained a well developed profession, with most states still assessing land separately from buildings, even though they base their taxes on gross or 'flat' (i.e. undifferentiated rates).

Rybeck estimates that more than 68,000 jurisdictions within the USA have authority to levy property taxes. His analysis of certain varieties of this tax includes jurisdictions where the tax rate is undifferentiated but the practice of assessors is to deliberately under-value land as compared to buildings: in effect to un-tax land values (Andelson, 2000:160-164). He also points out that many assessment authorities ignore statutes that require regular revaluations to be undertaken. His remarks may not be directly relevant to Value Maps but they

serve as a warning that the utility of valuations and the acceptance of taxes based upon them is dependent on their quality: merely mapping those values does not of itself improve that quality, although it may highlight deficiencies in some respects.

With sophisticated, widespread LIS, near universal use of property taxes and a liberal attitude towards sharing GI, it would be surprising if CAMA and GIS were not highly developed in much of the USA. By 1998, Batt (2005) found that most states had completed digitisation of their tax records. Since 1997, thirteen annual joint conferences in GIS & CAMA Technologies have been organised by the Urban and Regional Information Systems Association (URISA) and the International Association of Assessing Officers (IAAO), both predominantly North American 'international' bodies, for GIS and tax professionals on the related subjects of GIS and CAMA (URISA, 2009).

Lincoln Institute, based in the USA and with its focus on land policy and land taxes in particular, had long collaborated with the Lucas County Auditor/Assessors Office in Ohio (German *et al,* 2000). The evidence obtained by this researcher has been mainly through his own support by the Institute, also from professional journals and conference contacts. A visit with a British Study Team to Pennsylvania (PA) in 2001, organised by the author, focused on the wider issues around property tax reform (Vickers, 2002b) in that state, not on value mapping *per se* or on the situation outside PA.

The early history of value maps in the USA is outlined in chapter two (p.22). This section covers sources mainly later than Howes (1980), notably Batt (2001, 2002, 2008).

Purpose of Value Maps in the USA

Since each state and even jurisdictions within some states have different legal bases under which property taxes are administered, there is no single standard or assessment authority or purpose for datasets that are produced in their support. However there is some form of *ad valorem* property tax in every state, so that the source of tax value data always bears some relationship to market prices for property and land, as at a given date. The frequency of revaluations and the accuracy and consistency of assessments are very variable, although IAAO has occasionally published 'league tables' showing how states rank in

assessment quality under a range of criteria (primarily average ratio between assessed and market value).

Maps are frequently produced to support property taxes. However, as Howes (1980:52) noted, the terms ‘taxation map’, ‘assessment map’ and ‘land map’ still today in the USA do not usually imply the depiction of assessed land or property values, even though any such maps are invariably associated with the property tax system. They can mean that a map exists to show how tax zones or ownership parcels are defined, rather than what the assessed values of land or buildings are. No study has been found by this author that purports to establish the extent to which Value Maps, as defined in this thesis, are used in the USA. However nor has any example of a Value Map been found in the USA that was not derived from property tax data: throughout the USA, Value Mapping appears to be entirely tax-led.

Assessors in the USA have long aspired to have assessment values depicted on their maps, reported Howes (1980:52): “to ensure more equity between assessments and to correct many of the apparent inequalities that exist” in the property tax system. German, in a personal email before this study began (German, 2001), stated that in his view the use of his Lucas County AREIS on-line mapping facility “was our attempt for some hands-on demonstration and use of our valuable data tied to electronic mapping”. It also served, he said:-

> as a quality control and public relations tool for the revaluation ….The taxpayers had complete access to … an easy to use mapping tool for researching and decision making. We were able to clean-up much errant data just by having the public view their parcel’s information. Also, this data has great economic value to the city and region. The data provides the opportunity for the successful development of the land and buildings in the county.

In explanation of that last point, German stated in a presentation to a British audience, in 2003: “When my on-line map-based property database goes down, the lights on my switchboard go up” (German, 2003). By this he meant that the level of use of the online AREIS database, much of it by prospective buyers and occupiers of property in his county, contributed unobtrusively but significantly to property market operations.

It would appear therefore that those in the forefront of using CAMA and GIS in the USA have achieved what Howes found their predecessors had hoped for: tax assessment data tied to mapping and thus given greater value. Nevertheless the demand for Value Maps outside of the tax system has not so far led to any nationwide aggregation of value data to satisfy wider markets, nor even to any state-wide examples of Value Mapping on a consistent basis. This probably reflects the diversity of legislation and administrative systems used in property taxation and the lack of any coordinating body to take on the task of normalising the data.

Some Common Features

Land use planning and zoning is at the discretion of local authorities in the USA, unlike Europe. Whereas states can require municipalities to maintain property taxes, state planning laws usually merely give local government the necessary powers to carry out zoning but not the duty to do so. Hence the basic building block of most Value Maps is the land parcel itself, since there are no definitive land use zones.

CAMA systems may involve publication of implicit zones used in computation but more often the examples seen do not offer the public the level of transparency given by the Danish Value Maps described above. However for those wishing to understand their tax assessments, systems such as AREIS offer a far richer store of the underlying property data (see below), including *de facto* zoning.

AVMs used by American tax authorities for CAMA are often highly sophisticated (Gloudemans, 2002; Ward *et al,* 2002), drawing on a wide range of detailed property and spatially-related attributes: sometimes over 100. Most municipalities have maintained detailed registers of property transactions for decades, enabling the entire history of individual properties and land parcels to be made available to assessors, if they have the computational skills and resources to take account of them. However this very richness of data makes it difficult, without AVMs, to depict spatially the patterns of variation in the many different property variables that affect the calculation of land value (Ward *et al*, 2002). The heterogeneity of much of the built environment, which results in large part from the lack of zoning and dominant role of small home builders in the property industry (as compared to Britain – observed by the author on his

visits) means that there are more micro-level variables in property data than traditional British methods of valuation would easily handle.

The kind of analysis which Gloudemans (2002) and others in the USA use (normally MRA), as described in chapter two (pp.54-5), enables quality assurance of assessments – entire systems as well as individual values – to be carried out. However this is still the exception rather than the rule, possibly because of the 'open records' policy acting as a disincentive for small municipal or county authorities to invest in the necessary technology. Although CAMA and AVMs enable land value to be separately assessed, they still depend on consistent and accurate data inputs. Only where the land value element of the property tax is at a higher rate does any deficiency in assessment methodology become exposed, as happened in Pittsburgh in 2002 (Vickers, 2002b:18). In Pittsburgh, it is significant that value maps were not used either to help prepare the revaluation or to proactively explain the effect of them on taxpayers.

Organisation of property tax and value mapping

The Federal US Government does not undertake any comprehensive large-scale mapping. It is either the municipalities or (more often) the counties that are responsible for such mapping, both cadastral and topographic. The FIG Commission 3 respondent to the pilot survey in 2002 stated: "Most cadastres are based on unsurveyed data....some counties have no cadastral mapping while others are very sophisticated." Specifically on Value Maps, Batt (2004) stated that USA "sporadically" plans to use them. He referred the author to the Office of Real Property Services (ORPS) of New York State, where the status of counties' digital tax maps is monitored (ORPS, 2008a). As at October 2008, all but two of the 58 counties in New York had completed digitisation of "arguably the most complex property tax system in the nation" (ORPS, 2008b). However this state has 1128 tax assessing jurisdictions "each of which determines its own standard of assessment and reassessment cycle", whereas Montana state has just one.

As regards frequency of reassessment, which is usually prescribed by state law, the 2000 IAAO survey showed a large variation: 12 states were like New York and did not require cyclical reassessment, whereas ten require reassessment every one or two years (ORPS, 2008b). Within New York State, there are some smaller municipalities with only a few hundred properties that have not

reassessed tax values since the Civil War 150 years ago, yet “many municipalities reassess annually”. Like PA, NY has a “maze of intertwining and overlapping boundaries of school, fire and other special districts”, each with power to raise different levels and kinds of property taxes and often without internally consistent assessments. According to ORPS (2008b), some states are reforming their property tax laws, generally by merging assessment units and giving grants to counties to upgrade their systems.

As Batt (2004) explained, “some local governments have now digitised their parcel polygons, but they now want to get their money back and are charging so much for the file layers that no [outsiders] can afford them”. If the business case for mapping of tax parcels is based on external sales of data, the ‘open records’ regime in the US combined with diversity among thousands of local systems and data formats militates against success other than in “populated areas”, according to Feindt (2002), the FIG Commission 8 respondent to the pilot survey. She also stated that most local governments completed their manual cadastral maps around 1900. However Ireland and O’Connor (2002) claim that “statistical modeling and GIS techniques have value for small and medium-sized jurisdictions, as well as for larger” ones, provided that “existing assessments have a strong relationship to actual market conditions”. Their article in the Assessment Journal includes several examples of Value Maps of Bloomington, Illinois.

As there are so many local tax and cadastral mapping authorities in the USA and no formal inter-state coordination of their activities, it proved beyond the capability of this research to conduct a quantitative study of them. The approach taken was to investigate the one authority which was known to have a very effective system: Lucas County, Ohio. AREIS has been mentioned previously and it is the only example found where the property tax data has been merged with other land information by the tax authority and proactively made available to the public with software to produce Value Maps.

AREIS Capabilities

Figures 6/2-5 show the level of detail and graphic analysis and manipulation possible with Lucas County’s AREIS dataset.

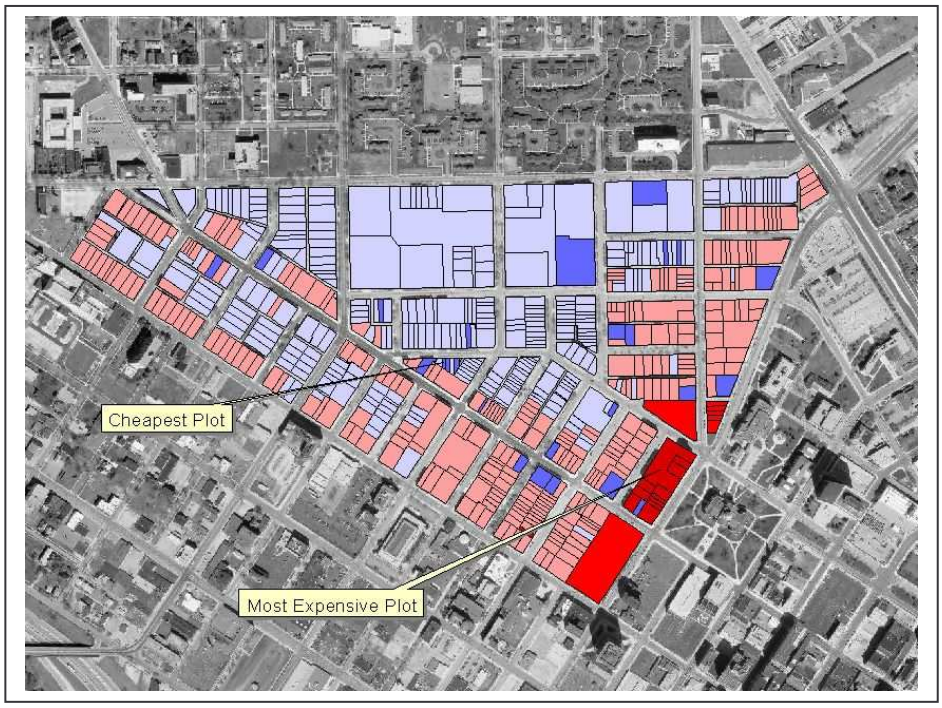

Figure 6/2: Part of Toledo City, Ohio: Chloropleth Map of Site Values Superimposed on Air Photograph

Source: Vickers (2002b:80), Slide 4, prepared by Mark Thurstain-Goodwin, while at the Centre for Advanced Spatial Analysis (CASA), UCL.

Figure 6/3: Toledo, Ohio Site Values Tinted Contour Value Map (for Higher Value Areas only)

Source: as Figure 6/2 (Vickers, 2002b:79) slide 1.

Figure 6/3 covers a larger area than Figure 6/2, extent of which is towards the top. However here the lower land values are excluded from this illustration of 'downtown hotspots', which just cover the east and extreme west of Figure 6/2, as can be seen by comparing the aerial photo image in both figures. The **pattern** of land values is here clearer at a medium scale of interpretation, whereas the parcel level **detail** is absent. The stepped effect of the 'contours' is created by the graphics software, as one way of deliberately degrading the impression of precision that otherwise might be given. Alternatively more value bands and colour tones could have been used, so that value zones shaded into each other.

The same area is shown in Figure 6/4 but here using the 3D graphic software to simulate an oblique aerial view of the solid pink landvaluescape, visible through the building value lattice 'surface' draped over it. In Figure 6/5 the major downtown area only is shown, with a different combination of 3D treatment of land values, topographic features and height shading. A smooth contouring is used, not stepped as in Figure 6/3, with every fifth contour picked out in bold red line.

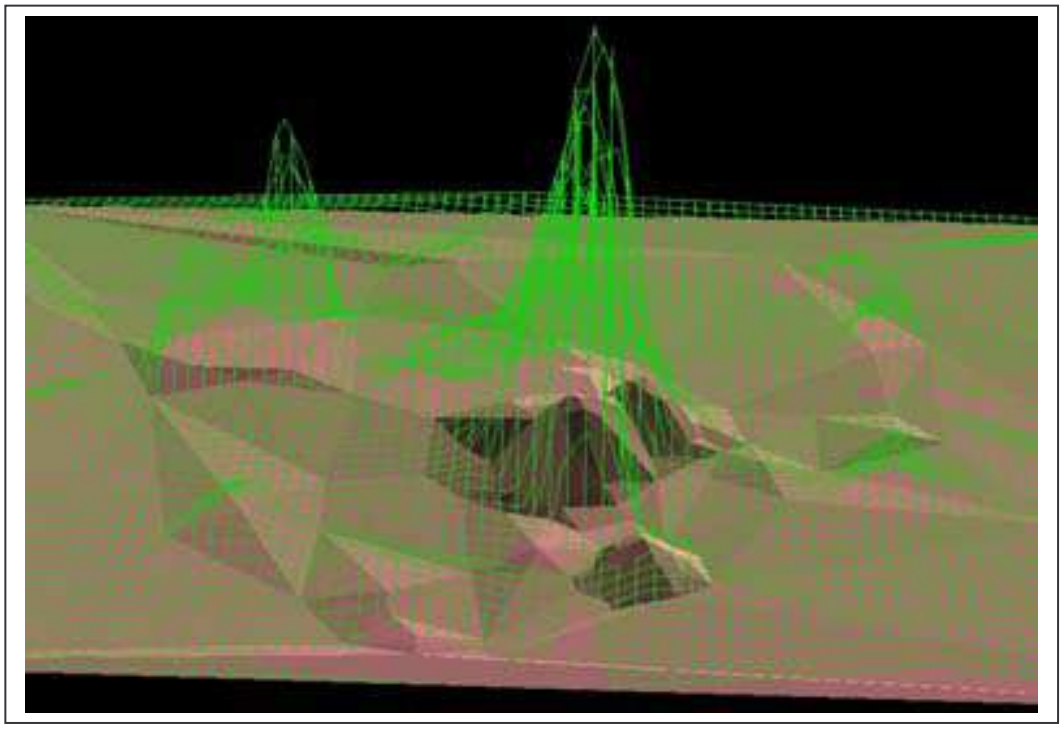

Figure 6/4: Toledo, Ohio Property Values – Orthogonal Lattice View.

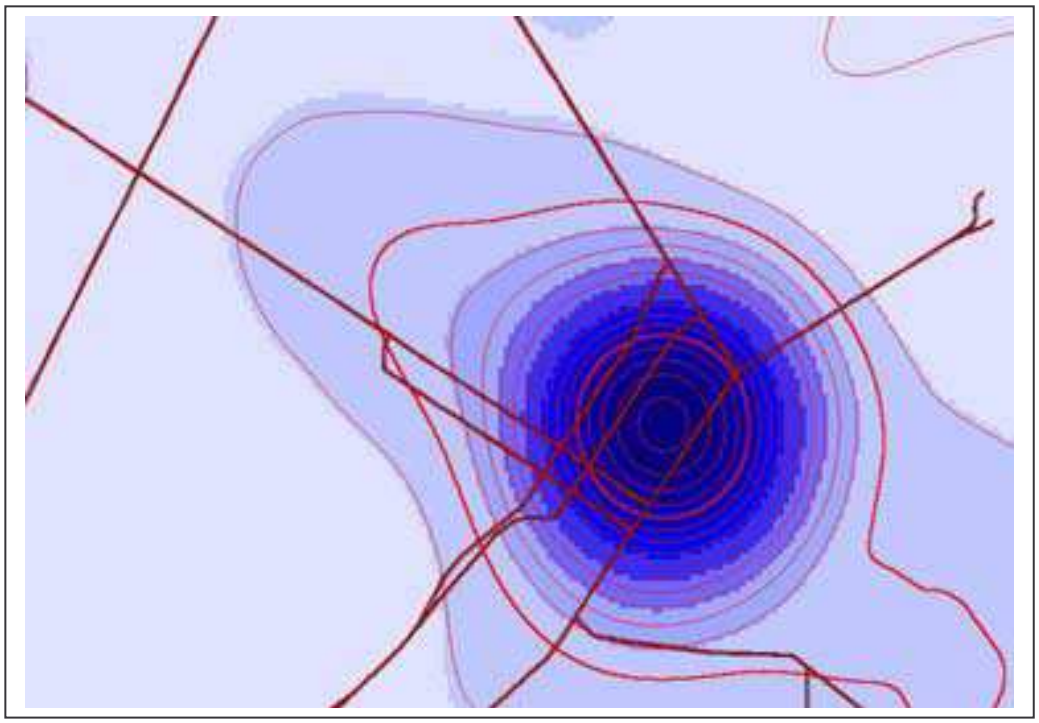

Figure 6/5: Toledo City Centre Landvaluescape with Road Network

Use by Tax Reform Campaigners

The Centre for the Study of Economics (CSE) in Philadelphia has used Value Maps in at least twenty cities in PA alone, taking the tax authority data and manipulating it for the specific purpose of demonstrating to property tax stakeholders various aspects of the current tax system and alleged benefits of reform. Batt (1998), a CSE Director, has also used them in parts of NY and elsewhere in the eastern seaboard states where his Central Research Group undertakes similar studies in support of campaigns for property tax reform by legislators and others (CSE, 2009). Batt builds upon the long history in NY of working with land value surface models, described in chapter two above.

Arguably it is only because of their legal right to reuse property tax data where it exists, at no cost, that it is possible for campaigners to employ specialists like Batt to support their efforts to spread the understanding of property tax reform benefits in the USA. Often non-specialists in GIS from CSE and other campaign groups can work directly with municipal and county or state tax officials who are already familiar with GIS and CAMA, which is rarely possible in the UK.

Concluding Remarks

This section has only covered a tiny fraction of the scope and diversity of property tax systems in the USA. It has touched on some that are immature and probably incapable of supporting useful value mapping. It has also dealt in some detail with one of the most sophisticated and holistically planned examples. In between, there is a very fertile community of tax assessors and GIS experts learning from one another, with a great variety of ‘test-beds’ in tax-based value mapping to draw experiences from.

What the USA can teach other countries is that an ‘open data’ regime has some advantages for campaigners wishing to lobby for tax reform using value maps as a tool to help taxpayers understand ‘landvaluescape’ and the effect of different taxes on local economies. However the disadvantage of the regime in the USA is that it makes nation-wide (or even state-wide) value mapping very hard to achieve, however strong the moves towards LVT.

6.5 Lithuania

Unlike the other countries studied, Lithuania has been able to design its property tax and value mapping systems almost from scratch. There had been a free market in land and property before the Soviet era (Ramanauskas, 2007: 3) but a priority for all three Baltic States since independence in the early 1990s has been the creation of efficient, modern information systems to "strengthen nascent real estate markets" (Malme, 2004) while "transitioning to market economies".

Assistance has been provided by neighbouring Scandinavian and other EU and overseas organisations, notably the Lincoln Institute, through whom access was obtained to relevant officials attending a seminar for Latvian and Lithuanian tax authorities in Vilnius in October 2004 (Lincoln Institute of Land Policy and State Enterprise Center of Registers (SECR), 2005) and, while there, other value mapping stakeholders. However the high standard of education in these countries and their lack of 'heritage' IT constraining their modernisation has resulted in them quickly becoming among the leading exponents of CAMA and GIS "unambiguously associated with the intended introduction of a market value based real property tax" (Bagdonavicius and Deveikis, 2006). SECR and Lincoln Institute have been delivering courses on market value-based property taxes for officials in European countries undergoing economic transition since 2003 (Malme, 2004).

Lithuania has created a modern map-based cadastre and valuation register in less than ten years. Value maps were seen as integral to the process by the World Bank, which noted in a recent report on new EU member states that "up-to-date land value maps [were developed] in anticipation of a new law on Land Taxation in 2005" using "market [value] elements" (Dillinger, 2007:24). Malme (2004) reported that these maps "were completed and made public in 2003".

Purpose of Lithuanian value maps

Although value maps were justified initially purely as an adjunct to the new property tax, their introduction quickly led to interest in using them for wider purposes: property market analysis and spatial planning being among the uses cited by those to whom this researcher spoke on his October 2004 visit, summarised in Vickers *et al* (2006:580-581). These included the Mayor of

Vilnius' economic adviser and Director of GIS and Cartography of the National Land Service[1].

Since the main motive for introducing a modern, market-based property tax was to stimulate the property market (UNECE WLPA, 2004), the design of the tax system took account of the wider needs of that market for property information. As with all former Communist countries, initial property tax valuations were crude and formulaic, because there was no market from which to draw price information. Registration of land rights, accompanied by tax liabilities, allowed the market to develop, while also providing continuously improving market data for the tax assessment system. As that system developed, using value maps as an integral part of CAMA, the maps provided transparency to taxpayers and market players alike. While the Lincoln/SECR 2004 seminar was in progress, the Government passed a law "giving superior status to [SECR's] assessments over those of privately commissioned valuations" (Vickers *et al*, 2006:581) and delegates were told that "municipalities and the Social Assistance Ministry have expressed interest in using their valuations for non-tax purposes". The Deputy Director of SECR said: "Transparency of property values helps make such a tax acceptable" (*op cit*, p.580) and implied that the value maps appear to have helped the tax authorities defend appeals and politicians explain the tax rises consequent upon a booming economy in the more prosperous parts of the country.

Value maps as part of integrated land management systems

Perhaps more significantly for this research is the fact that the logic of their planned introduction of a modern market-based property tax led the Lithuanian authorities to also introduce automated and integrated property transaction and registration, with GIS as the glue holding all LIS' together. This allows prospective and actual property market players access to information on "the one-stop shop principle" which the 2004 UNECE report says "is seen as a key priority" (UNECE WLPA, 2004:5). SECR is the single agency responsible for managing all property information or "cadastre GIS" (Ramanauskas, 2007:29): from administrative boundaries to attic floor plans, cadastral maps at 1:10,000

[1] The section on Lithuania in Vickers *et al* (2006) was based on contemporaneous notes made by the author during his visit to Vilnius in October 2004, using unpublished quotations. The text was checked with those mentioned in the published paper.

(and larger scales) and photographs. However topographic mapping is separately produced by National Land Service.

Speaking to the 2006 FIG Congress, directors of SECR expressed the view that their modern property tax was predicated upon having a reliable and comprehensive set of land management systems:

> When developing a mass valuation system and analysing an opportunity to implement AVM and CAMA system in Lithuania, a conclusion was made that a key element for the establishment of mass valuation system and its successful operation is an automated real property formation and registration system developed in Lithuania, also a fully integrated real property, cadastre, register and GIS database, covering all types of properties, and a system of transaction data created on the basis of such database. Therefore, while introducing our experience of mass valuation, at the same time we have to talk about the real property database developed and its operation (Bagdonavicius and Deveikis, 2006:3)

Data and processes

By 2005, the Lithuanian real property database contained records of over 5.5 million objects and over 700,000 transactions since 1997 (Aleksiene and Bagdonavicius, 2006). By 2003, when the mass appraisal system was launched, it was already apparent that having the value maps open to public access would help make the tax system transparent and acceptable. Since 2005, the mass valuation process has been run annually, based on the market as at 1 July. In cities with higher land values, there are more valuation zones to take account of the greater significance of location as a factor in property values (see Figure 6/6).

On average, around 4% of properties change owners each year, which provides a robust volume of transaction data in most sectors. Seventeen attributes or ‘factor clusters’ of property are collected in respect of all transactions and used in the CAMA process, such as method and year of construction, numbers of floors and rooms, type of heating and presence of water supplies and sewage facilities (Tumelionis, 2006:71).

The valuation models are derived by an iterative process in which accuracy of property characteristics and transaction data are vital. MRA is run on an initial

value zoning basis but zones are adjusted until the accuracy of assessed values as compared to actual market prices is statistically acceptable. The MRA produces 'indices' for the property variables including zones, which are then applied to individual properties for tax assessment and published alongside the value maps. In this, the graphical analysis of interim value maps by the tax authority is a key component, prior to publication of final adjusted results. GIS makes the whole process both far more accurate and far less expensive than manual methods.

Availability of maps and future development

As Tumelionis (2006) has explained, one of the most important documents in SECR's reports for municipalities on the yearly revaluations is the value map. SECR also has a website from which taxpayers can access value maps by keying in an address register record identifier. Taxpayers are not sent value maps with their tax notice but can use the publicly available internet site to check the relative accuracy of their assessment with the help of value maps.

According to Tumelonius, "more extensive application of GIS" is planned, in order to "appraise the impact of location" and "avoid the significant difference in values between neighbouring value zones". Temporal trend analysis is also a planned use for value maps.

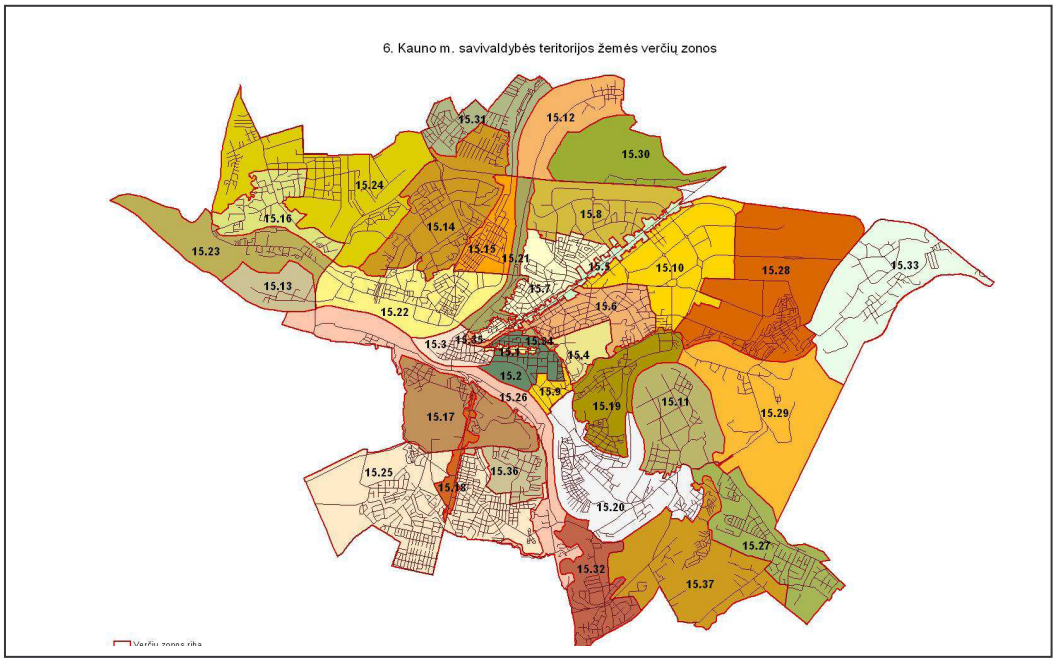

Figure 6/6 – Residential Land Value Map: Kaunas

Source: SECR, 2009. Lithuania's second city, land value zones numbered and colour coded, with streets.

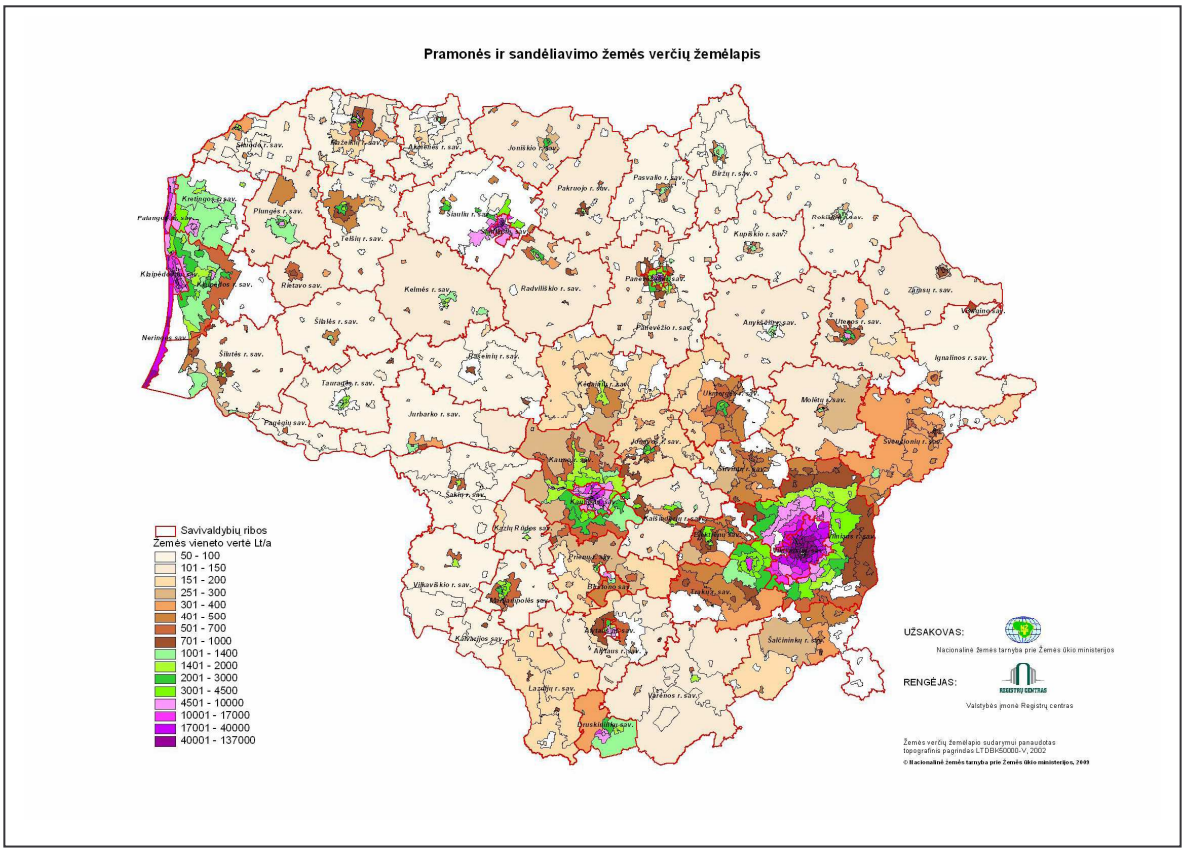

Figure 6/7 – Lithuania: Commercial Land Value Zones

Concluding Remarks

Lithuania has been able to conceive of Value Maps from the outset of its economic transformation planning as of wider potential benefit than just quality assurance and transparency in modern property tax administration. That is because of its rapid and recent emergence from communism, allowing a ‘clean sweep’ approach to public policy initiatives with efficient property markets at the heart of the transformed economy.

With support from overseas experts who had experience of best practice in CAMA used with GIS, a holistic cross-departmental national plan has evolved and is being implemented with value maps at its heart. Whilst not requiring LVT to be introduced at the same time, it is unquestionably tax reform led but with wider property market benefits being realised early in implementation. It remains to be seen whether those wider benefits assume a greater role in the overall development of value maps.

6.6 Sweden

Sweden operates a highly centralised tax system where “the National Tax Board and six regional Tax Authorities administer the entire Swedish tax system” (Swedish Tax Administration, 2000). Since 1998 each taxable entity (individual or company) has had to complete a single annual tax form, which incorporates property address information. Much of the information is pre-entered from previous tax returns and great emphasis is placed on ease of use for the taxpayer. Swedish land and property information is also highly centralised and very comprehensive.

The author’s visit to Sweden in November 2005 (Vickers, 2005c) enabled him to understand how this centralised and integrated tax system linked to the centralised land information system and how the two systems used value maps. Meetings took place with officials at both the central Tax Board and *Landmateriet*, the National Land Survey Department.

All the taxpayer needs to do each year is to declare changes in any properties they own. The tax authorities can check this with land registers and link it to other information about those properties to calculate tax liability. The tax payable on an individual property is a function of general and local mass revaluations, any changes in that property’s characteristics and changes to the tax rates. Property tax is paid in a single transaction along with all other taxes, by owners not occupiers. For owner-occupier employees therefore, it is concealed within the tax deducted from earnings at source. They “are deemed to [have] received the benefit of not having to pay rent” (Brown and Hepworth, 2003:446). Owners who rent out domestic properties have their property tax offset against income tax payable on rent received from tenants.

Local government precepts into these unified income and corporation tax systems, which until recently each included an additional wealth tax element. According to the Tax Board official in charge of the real estate tax, most ‘wealth’ is real property.

Land and building values are automatically distinguished within the CAMA system used, although there is no separate land tax. National revaluations take place every three years for commercial properties (Farnkvist, 2006) on a local basis, every six years nationally for other categories of property, on a rolling programme with a different category each year. Local adjustments can

be made if property market conditions vary significantly within a region. The ‘tax value’ for real estate tax is set at 75% of the assessed value, which “provides a cushion against any valuation error that may occur” (Brown and Hepworth (2003:447). According to the Tax Board official questioned on the subject, appeal rates are low and do not constitute a problem.

Purpose of Swedish value maps

Sweden has never had a separate tax on land nor any other statutory reason to produce separate land value assessments. Land value maps are a by-product of the CAMA/GIS techniques employed, which *Landmateriet* claim to be among the most advanced and cost effective in the world and the basis for a significant consultancy business, Swedesurvey, with other countries as clients. The land values are used to support certain aspects of the property tax system, such as exemptions from the building element (and any land value uplift) resulting from new development. This is only granted to the owner of newly developed land, as a positive incentive to develop where planning permission has been granted. Full exemption from the building element is granted to new residential development for five years, with partial exemption for a further five years (Swedish Tax Administration, 2000:8). This is totally opposite to British Planning Gain in rationale and effect, especially since all the revenue goes to the national government. Also in contrast to Britain, property tax remains payable on the land value element of unused property: a kind of vacant land tax.

There is also a high proportion of leasehold property. Here the freehold landowner pays only the land value element of property tax, with the leaseholder paying the building element (tenants who do not own a lease pay no property tax). This explains why, according to the *Landmateriet* officials who maintain and develop the land value maps, the underlying Real Property Register data, which includes land values, is used extensively by property market players, insurers and lenders. However the maps themselves are not available online.

No research to describe or evaluate such wider uses of the Register or to establish whether users create their own Value Maps from it, was identified by the author. No attempt has so far been made by *Landmateriet* to charge for viewing the Register and no efforts appear to be put into adapting their

internal value maps for non-tax uses. However all information concerning real estate purchases is in the public domain (Färnkvist, 2006).

The assessment system demonstrated to the author on his visit was able to draw on a very rich database of land and property information, including soil and slope conditions and building construction and history. It is therefore not surprising that use is beginning to be made of the resultant value map layer by property market players (Roos, 2009). Even before computerisation enabled the maps to be kept updated easily, at a national level Howes (1980:64) found in the 1970s that statistical property assessment data was being used to study regional trends in prices.

Features of Swedish value maps

The country is divided into over 9,000 ‘value zones’, for the purpose of assessment. In each zone, properties have reasonably uniform characteristics, including locational attributes such as proximity to water (highly valued in Swedish society, according to the author’s contacts on his 2005 visit). The average value of each variable property attribute is calculated and published for each zone as part of the process of regular updating of the values of 3.2 million properties in the country. Commercial property includes all multi-dwelling blocks and is valued using a different model to single-family homes. About 2000 of the value zones in Sweden are commercial, some of the city centre zones being quite small in area.

The definition of value zone boundaries is one of the features of the Swedish system over which most care is taken. It involves close liaison with the municipal authorities, because HABU is the basis of valuations and potential land use is important – not just actual use (Brown and Hepworth, 2003:447). It is recognised that land without buildings but with development rights is affected by location factors, hence the importance of separating land from building value in the model. The absence of vacant land sales is not seen as a problem.

Within a zone, properties of a specific type (e.g. single-family homes) will be given a common tax value, moderated by certain factors whose value is also fixed at an average for that zone. Value maps portray the zones in relation to topographic features but are not normally used to portray ‘landvaluescape’ in model form (see Figure 6/8). However the entire Real Property Register is

publicly available, free of charge, by inspection at local offices or - since 2003 - over the internet. Much of the database, including value zone constants, can be processed and displayed using software that is available to most businesses involved in property, so that many ways of analysing it graphically are possible.

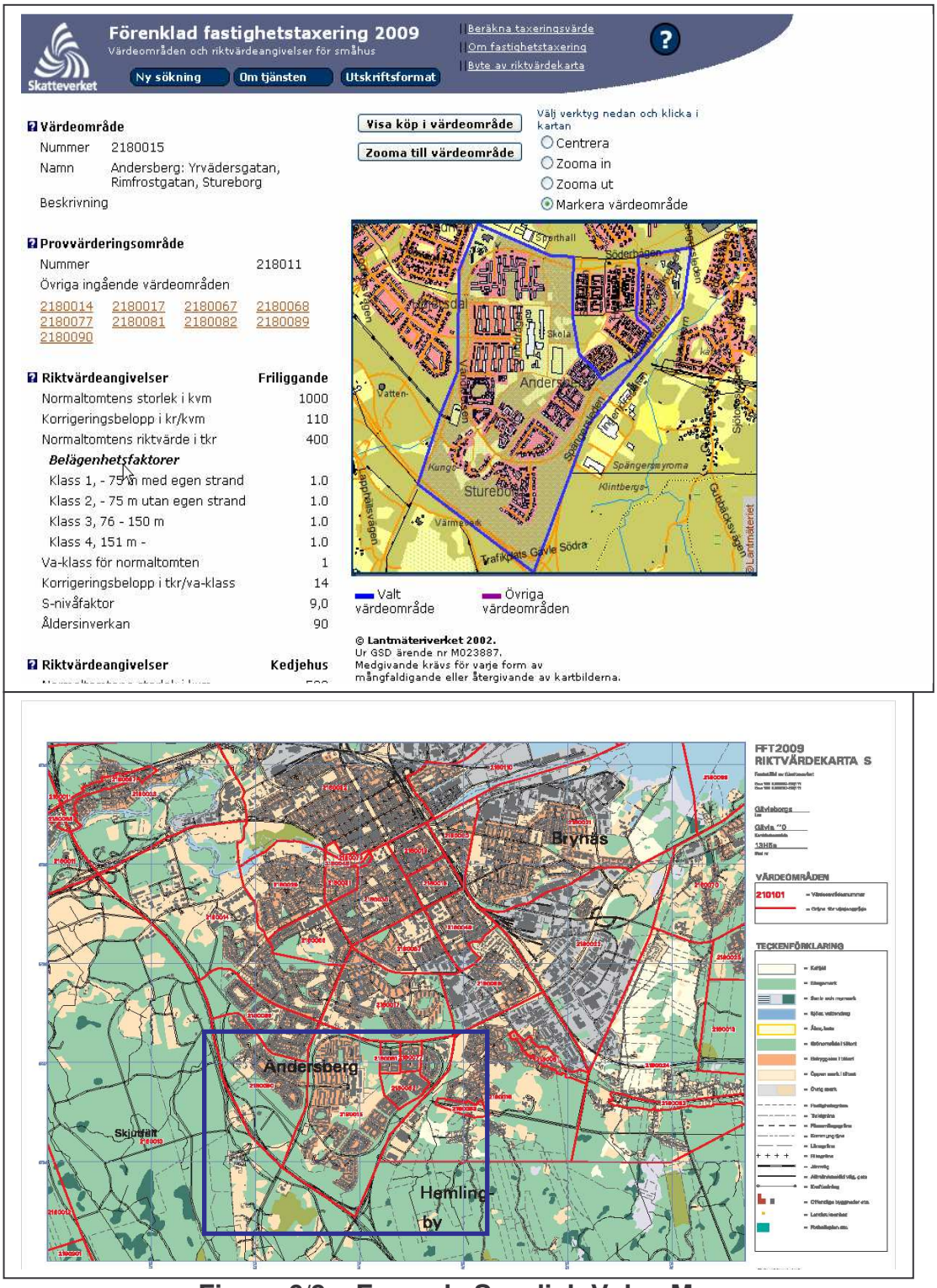

Figure 6/8 – Example Swedish Value Maps
Online above, printed below.

Organisation of property tax and value maps

Policy on all aspects of property tax is the responsibility of a small section in the Ministry of Finance (Färnkvist, 2006). *Landmateriet* is responsible for the cadastral map base, the valuation models and the computer systems used to create the assessments, including the value maps. Value maps are only produced for internal use by the survey and tax authorities and are not currently available online, although the data is and the map layer can be bought (Roos, 2009).

The Swedish Tax Board is responsible for maintaining the register of property transactions and its local offices communicate with property market players and their agents, also the local planning authorities, to ensure that market information of good quality is given to *Landmateriet*.

In the three-year commercial property valuation cycle, the 2007 valuation started to be planned as soon as the 2004 valuation came into existence, with 2003-05 market transactions as the basis for the new valuation model.

Value maps are extensively used during the market analysis, to help apply valuation resources to where the market has changed most. Typically the number of value zones increases by 10% with each valuation.

The decision to adjust or increase numbers of zones may trigger collection of additional property rental information from owners, to improve the model. Because the resulting maps help the market, there is little or no resistance to supplying data. Building age is important too but this only needs to be collected once: Sweden has a 200 year history of collecting property information.

Concluding remarks

Sweden may not publish Value Maps (at least its most detailed ones) but it clearly uses them as an integral part of its property tax system. Despite not having had any history of taxing land values explicitly, the Swedish experience shows that it is advantageous – if not essential in the modern age of CAMA/GIS – to produce land value maps to secure the best possible results from market-based tax assessments.

Even without LVT, a property tax system can be designed to make extensive use of land valuations and the resulting data can be applied to many uses

outside the tax system. However the primary justification for Swedish value maps remains tax-based. There is no evidence that land valuations or value maps would have been produced through a property market led initiative.

6.7 Australia

The Commonwealth of Australia consists of six states and two territories, each with many municipalities. The states and territories have different property tax systems and some states allow diversity of municipal property tax systems. This reflects history and constitution (Forster, 2000).

The formation of the states, and the Commonwealth in 1901, coincided with the height of global influence of the ideas of Henry George, the radical American “Single Tax” (LVT) campaigner (George, 1898), hence the predominant property tax system since then has been LVT. Australia was chosen as one of five case studies in LVT by McCluskey and Franszen (2001:24-42) and this author draws on the work of McCluskey in other publications.

Since around 1980 there has been a move towards capital improved value (CIV) as the basis for local taxes but the valuation systems across Australia still provide site values (SV) on a statutory basis. Hence Australia was chosen as a case study early in this research, because it was thought that there would most likely be several different implementations of Value Mapping.

Since about 1970, states have been merging the functions of survey, registration and valuation of land (Williamson *et al*, 2006:8). The valuation systems are controlled by states, which levy property taxes – as can the Commonwealth Government. However it is the municipal governments which depend overwhelmingly upon property taxes (McCluskey and Franszen, 2001:41). Many of these have few professional valuers in their employment. Hence valuation systems need to be simple and transparent to understand.

According to Anderson (1996:3), "The process undertaken by competent valuers to value such property for assessment purposes is not considered difficult, though specific problems do occasionally arise.” Anderson notes an important feature of the Victorian system is that it does not require the ratepayer to keep any records or submit any returns. He notes the historical context of the move towards SV rating in the late 19th century and the moves away a hundred years later. The peak for SV was 1980, when two thirds of Australian local authorities used it. McCluskey and Franzsen (2001) took the

view that Australia's experience was indicative of a trend globally in developed countries, caused in part by technology enabling more frequent revaluations and better quality assurance of assessments.

Most of this section deals with the practice in Victoria, where since 1993 there has been a marked move away from use of SV for taxation but where also the latest 2002 modernisation of the valuation system retained SV as an option for municipalities (Land Victoria, 2002). Indeed the tax authorities must still "assess in all three forms" (McCluskey and Franszen, 2001) despite, even before the modernisation, more than 90% of municipalities choosing CIV (Net Annual Value being the third 'form'). The reason for choosing Victoria was that the tax authorities provided background information and maps, whereas Queensland (which also recently underwent tax modernisation) did not.

Victorian value maps

Since 2002, revaluations in Victoria have been biannual. A detailed description of the methods used, purpose and specification of value maps to be prepared for the 2008 revaluation of Monash City in Greater Melbourne was obtained for this research from the Victorian state lands department (Monash City Council, 2006). Monash was the only municipality to choose SV as the basis for its property tax and sales data from 2006 and 2007 forms the basis of property taxes levied there in 2008 and 2009. The state produces Vicmap Property maps as a digital cadastral base for valuation contractors and local councils to use in preparing, analysing and disseminating their property tax assessments (Monash City Council, 2006:1). The Council here describes the use of Value Maps within the tax system:-

> Linked to a geospatial framework, property valuations can be viewed and analysed in digital format within GIS. Spatial representation of values enables consistency checking, identification of trends and anomalies and location/spatial clustering of sales.

The specification for Property Valuation Maps to be submitted by contracted valuers to the City Council describes three types of map. These are required deliverables along with the revaluations themselves:

- Sales map, to show geographic spread of sales data used in the revaluation exercise. This spread affects the quality of derived assessments (the more densely and evenly spread, the better);

- Value-shift map, to show the variations in rates of change of value (SV and CIV), see Figure 6/4 below.
- Level of Value Map (Figure 6/5), showing ranges of SV per hectare by block (zone) and used for “checking level of consistency of adjacent properties and around municipal borders”.

The maps below show how much smoother a surface is obtained from SV than CIV, even with chloropleth rather than 3D.

Figure 6/4 Monash City Value-shift Map
Source: Figure 1 in Monash City Council (2006:142).

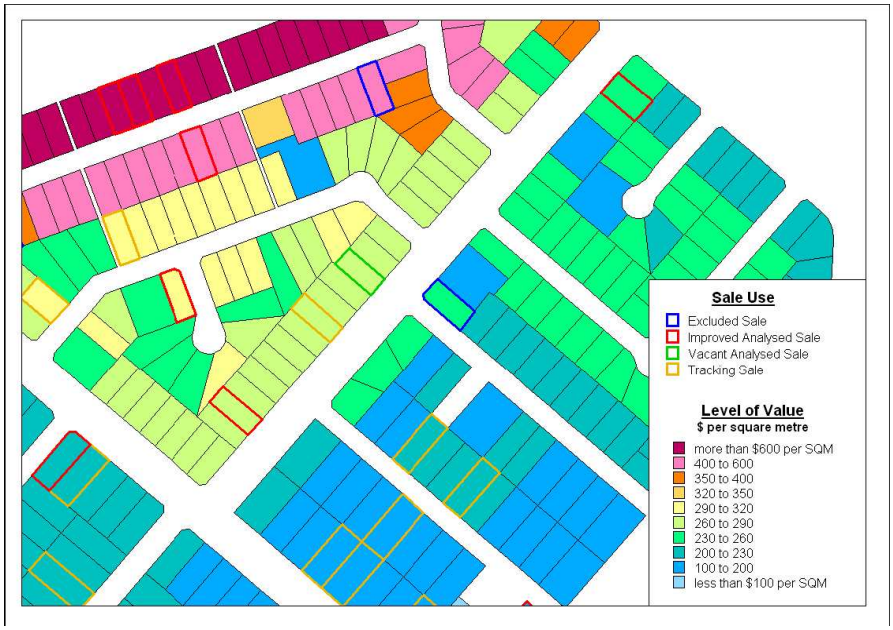

Figure 6/5 Monash City Level of Value Map
Source: Figure 2 in Monash City Council (2006:143).

The Monash specification recommends other kinds of Value Map be supplied: Value Shift Ratio Map; Sales Ratio Map; Added Value of Improvements Map; Rent Rate Map. This demonstrates the power of the map to aid analysis of the local property market and improve the quality of property tax assessments. It also suggests that other Vicmap products (e.g. topographic and hydrographic data sets) be used to quality check the Value Maps: “mapping is an integral part of the valuation process, allowing the valuer to check spatial patterns and anomalies that would not be apparent within a spreadsheet or database”.

An earlier Fact Sheet by the state Department of Natural Resources and Environment (Land Victoria, 2002) explained to the public some benefits of the newly digitised value maps: “easy identification of errors, quick returns of valuation information and the ability to identify property trends…For ratepayers this means more up-to-date and accurate valuations.” The leaflet went on to describe some of the wider uses of GIS without making clear whether Value Maps were an integrated part of “environmental planning, economic development and asset management” GIS tools.

Concluding Remarks

As with the USA, this one (Monash) example of the use of value maps in a very large, diverse and Federal country does not prove that they are vital economic tools in their own right. However it does show that they can be regarded as sufficiently useful aids to any modern property tax system in a developed country to be included in the specification. As well as aiding quality assurance of assessments, they can be used to help achieve transparency and acceptance by taxpayers of the assessed tax values.

The wider non-tax uses remain as mere aspirations in the minds of certain officials but are nevertheless acknowledged, although there seems no doubt that in Australia as elsewhere none have thought of value maps as anything other than a by-product of the tax system.

6.8 Global conclusions

Origins and Drivers.

From the case studies, it seems clear that Value Maps always derive from modernisation of property tax systems. This invariably exploits GIS, so that Value Maps are a by-product of tax modernisation for use within the tax system. They are not always deployed either for public access to help achieve transparency and acceptance of tax assessments, or for wider non-tax uses.

Value Maps appear not to be an inevitable adjunct to modern tax systems but there is a strong tendency for them to be used. They are usually conceived of as an aid to improving the accuracy of assessments within the tax authorities. Sometimes, as with Lithuania, other uses are considered from the outset. More often these come later, in implementation if not in conception - but sometimes as a spin-off and not as a design feature.

As computing power increases, so the frequency of revaluation tends to increase as well as the ability to analyse many variable factors affecting property values and hence achieve more robust tax assessments. Therefore the potential for tax-derived values to have wider uses in the property market and for land management grows over time. Nowhere among these examples, except possibly in Lithuania, has there been an instance of planned system design of a value map system to meet such wider applications from the outset. Even in Lithuania, there is no evidence in any country of a comprehensive cost/benefit appraisal having been done or of any doubt that the primary purpose and sole justification for implementing a national value mapping programme is to achieve high quality, transparent and cost-efficient property tax assessments. However since the origin of all these examples of value maps in within the tax administration, that is to be expected.

Characteristics of Value Maps

As for the features of value mapping and the use of GIS in property taxation, there is no evidence of widespread use of 3D modelling of property values as envisaged for ‘Landvaluescape’ modelling. The most common type of value map is the chloropleth indicating value zones used in the tax assessment systems.

Other variables in land and property valuations are also commonly mapped within the tax organisations and the products may be made available publicly on the internet, either as datasets for external users to use with their own GIS software, as online maps to be viewed with an option to download, or as maps on CD-ROM with GIS software included.

Significantly the only example of land and property information being made available directly on-line and therefore of being routinely accessible for third party manipulation is Lucas County, where the national policy is not to charge for re-use of publicly acquired data. There is no evidence other than in North America of a market in property value data or of software having been developed specifically to exploit such data in 3D modelling applications outside the tax authorities. However there is some evidence that recently certain specialists working in those authorities in the more advanced countries have begun to see the potential for wider property market and land policy exploitation.