Measuring Liveability: The Contribution of a Census of Land Use and Employment

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Abstract

For several decades, Melbourne and Adelaide Local Governments have collected regular data about land use and employment for managing growth in their central business districts. In Perth, a similar collection has also been running for a decade or more. Recognising the value of that time series knowledge for their overall planning, they have more recently expanded that collection throughout their municipalities. Sydney has also done something similar, as has New Zealand. The State Government in Victoria is now testing the use of such a collection for its own strategic planning across its key metropolitan and regional planning areas and has so far trialled the use of CLUE (called VicCLUE) in 10 municipalities plus several industrial areas. In addition, another 4 municipalities have done collections of their own for key areas (or, in the case of Darebin, for their whole municipality). A tide of interest is gathering.

The Census of Land Use and Employment (CLUE), collects information on the way land is being used (or not used) plus the way in which built form changes both its structure and its use, and offers a more detailed count of employment occurring at each address. It allows a regular source of information about the changing nature of businesses - private, government and community -operating in an area. Such information can be used for service planning, emergency management and researching business cluster models, as well as assessing the need for infrastructure upgrades. The CLUE approach provides cost efficiencies by utilising data already collected for other purposes (ie. rates and valuations), retaining common data items across collections and enabling integration with a range datasets that can link directly or indirectly to property. Using this property level data structure it is able to cross-relate the concepts of property developed differently by institutions and legislatures.

CLUE information can be mapped in various ways (using GIS) to assist the understanding of spatial dynamics at address, street, block or other area level. In addition, the collection of data floor-by-floor lends itself to true 3D representation, as this paper will illustrate. The paper will also explore tentative next steps to enhancing access to, and use of, the CLUE data with a broader range of data available but not systematically integrated into easily findable and interpretable data repositories.

Introduction

Measuring and monitoring liveability is a complex task. An almost complete absence of quality and timely small-area property trend data for phenomena such as land use, industry and employment makes it difficult to monitor or forecast with any certainty the key indicators of liveability for example the number of jobs, proximity to open space and facilities. In an absence of data strategic planning and policy development can often be ad hoc, based on partially substantiated assumptions, or delayed until circumstantial evidence demands a reactive response. This significantly impacts on the value of policy; the later an intervention takes place to correct an existing problem then, in general, the less efficacious the intervention is in managing the problem (Ivan Surridge and Associates 2008).

In response to the need for small area data the City of Melbourne (CoM) has been using and developing a Census of Land Use and Employment (CLUE). Likewise, the Adelaide City Council and the City of Sydney have used similar approaches to collect information at property level. CLUE contains data about the use of land and the activities being conducted on that land. This enables a detailed analysis at property, building and floor level of all business, mixed use and industrial properties. It covers rateable and non-rateable properties and includes related information on residential properties. It responds to the need for current land use and business activity data to support and evaluate planning policies and the way in which the use of spaces changes over time.

For planners, questions such as:
- Are we able to monitor changes in land use in this area?
- Can I get the existing land use information for the new precinct we are planning?
- Can we monitor the number of jobs in this area?
- What uses are being made of floor space in the upper levels of buildings in this block?
- Do these buildings have suitable spaces for including a residential component?

are easier to answer with a database that has property level data, allowing them to adjust and aggregate the spatial focus of interest as planning and policy issues change. The CLUE system has provided guidance to the CoM over the past thirty years and over that time contributed to decision making and planning that has converted the CBD from a declining retail and commercial centre to a thriving metropolis of international status. It has also helped monitor the efficacy of the Council's strategic investment decisions in urban and economic development.

CLUE data can be applied almost universally across local government responsibilities, from business to retail, tourism, open space, urban design, strategic planning, neighbourhood renewal, transport and visitation. Its historical nature allows assessments of economic change, such as the impact of the GFC. At least one jurisdiction has fed their data into a regional model to estimate local economic product. The ability to integrate with other small area collections means that CLUE can also contribute to assessments of energy and water consumption, future infrastructure requirements and other factors that together make up a picture of local liveability.

The rollout of the CLUE collection across a wider range of local governments in Victoria has also opened up the need for a way to allow people in local and state government with different planning and service provision responsibilities to access the data easily and make sense of it for their own area of operation. The system that has been designed is helping expand the understanding of small area spatial dynamics. The Victorian Government Department of Planning and Community Development (DPCD) will also be testing the ability

of VicCLUE to integrate with the non-urban Victorian Land Use Information System (derived from satellite imagery, valuations data and ground truthing) to provide a more comprehensive picture for regional and rural areas.

To fully explore the CLUE system this paper is divided into three sections. Section one explains the data model. Section two provides examples of how the CLUE system can be used to benefit planners. Section three outlines the online CLUE system developed.

1.0 The CLUE data model

1.1 Collection method

The CLUE collection process involves surveyors or data collectors with specialist property level training physically inspecting each site in the census area as well as conducting interviews with the businesses located at each property.

The information collected includes the current use of land and the activities being conducted on (and under) that land. Details are collected about the use of every floor of a building and also about the different uses of the open spaces around buildings or in public areas (Figure 1). This enables a fine level analysis at property, building and floor level of all business, mixed use and industrial properties.
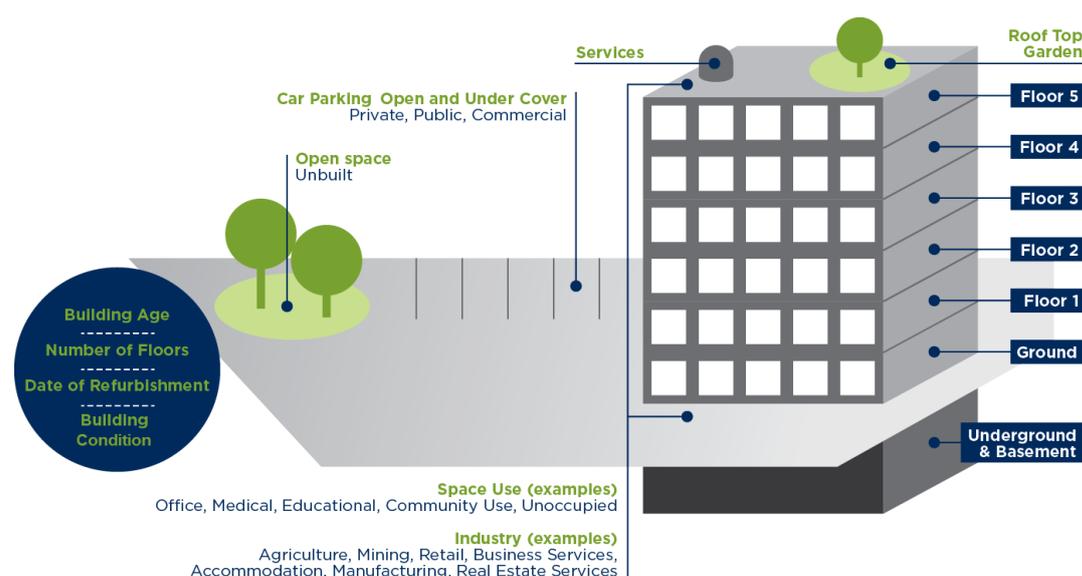

Services

Roof Top Garden

Car Parking Open and Under Cover
Private, Public, Commercial

Open space
Unbuilt

Floor 5

Floor 4

Floor 3

Floor 2

Floor 1

Ground

Building Age

Number of Floors

Date of Refurbishment

Building Condition

Underground & Basement

Space Use (examples)
Office, Medical, Educational, Community Use, Unoccupied

Industry (examples)
Agriculture, Mining, Retail, Business Services, Accommodation, Manufacturing, Real Estate Services

Figure 1: Sample building and data collected.

The data related to the building includes the number of floors, gross floor area, lettable area, date of construction, date of refurbishment and, for commercial buildings, the grade (according to the Australian Property Council Standards). Additionally information is collected on whether the site is currently subject to new construction, demolition, renovation or other works.

The data related to space use within the building is collected in accordance with the Australian New Zealand Standard Information Code (ANZSIC) classification system,

developed for use in both countries for the production and analysis of industry statistics. The ANZSIC structure comprises categories at four levels of detail, namely Divisions (the broadest level), Subdivisions, Groups and Classes (the finest level) (ABS 2003). By using the standardised coding system, CLUE data are able to be compared across census periods and geographic regions. However, the CLUE collection methodology is not identical to that used by the ABS in its population Census, and produces slightly different counts of employees The paid employment data collection is comprehensive and includes counts of full time, part time, casual, contractor, male and female for each establishment. The CLUE approach also seeks information about volunteer workers, enabling it to reflect the community sector amongst other private and public activity at property level.

Capacity measures, such as the number of hospital beds, indoor and outdoor café seats, cinema screens, child care places, and residential aged care beds, are collected. The CLUE approach is able to provide information at property level, for aggregation to user-defined geographies such as street block. Where it can, CLUE draws from existing council data. It incorporates data collected through the valuations process and then validates that information through direct visits to all properties in the collection area.

Businesses do already report some information to other agencies like the Australian Bureau of Statistics, but such reports do not cover the specific items in CLUE and of course are not available to other agencies for their own planning purposes.

2. How the CLUE system can be used

Throughout its thirty years of development, Councils have found the CLUE information indispensable for applications such as evaluating and reporting small area change, Municipal Strategic Statement (MSS) design and monitoring, sustainability analysis, economic development, and social planning. The data is now sought by a number of external agencies for applications such as emergency services, disaster planning and modelling future scenarios. As well as serving the data needs of a range of organisations and individuals such as consultants and tertiary students seeking to understand the dynamics and trends of particular parts of the central city's economy. Users of data include real estate firms, developers, and businesses seeking to locate, relocate and/or expand their presence in the municipality (Ivan Surridge and Associates 2008). The following sections provide examples of CLUE data providing an evidence base for decision making.

2.1 Planning
The City of Melbourne's Municipal Strategic Statement (MSS) was prepared in 2010 and sets out a long-term vision and strategy for the growth and development of the municipality. In essence the MSS aims to structure the City so that it is compact, mixed use and walkable targeting growth along public transport corridors and nodes to ensure the city is more efficient, accessible and sustainable.

To achieve the vision of the MSS, CLUE data has been used to identify areas for renewal and the calculation of the capacity of these areas given a number of planning controls and interventions. This process of capacity analysis aims to approximate the potential yield (population and jobs) that could be achieved in the renewal areas by incorporating land use patterns and building height information, the model goes beyond two dimensional areal analysis of development plots.

2.2 Supporting business

2.2.1 Enterprise Melbourne
Enterprise Melbourne is an initiative of the CoM which aims to provide a single entry point for CoM business and economic development information. Through the Enterprise Melbourne website businesses have easy access to research and statistics derived from the CLUE data. Examples of this data include the provision of over ten industry cluster maps which illustrate the spatial distribution of industries across the municipality, figure 2 provides an example of the employment in advanced manufacturing across the CoM. In addition to the cluster maps the CLUE data assists in supporting specific studies. In 2010 Enterprise Melbourne engaged consultants to conduct a financial services 'clustering' study to determine if Melbourne has a financial services hub. The research methodology was based on a quantitative analysis of available data from the CLUE data combined with data from the ABS and qualitative surveys with senior executives. The study indentified how the CoM could best assist in the growth and future development of the sector.
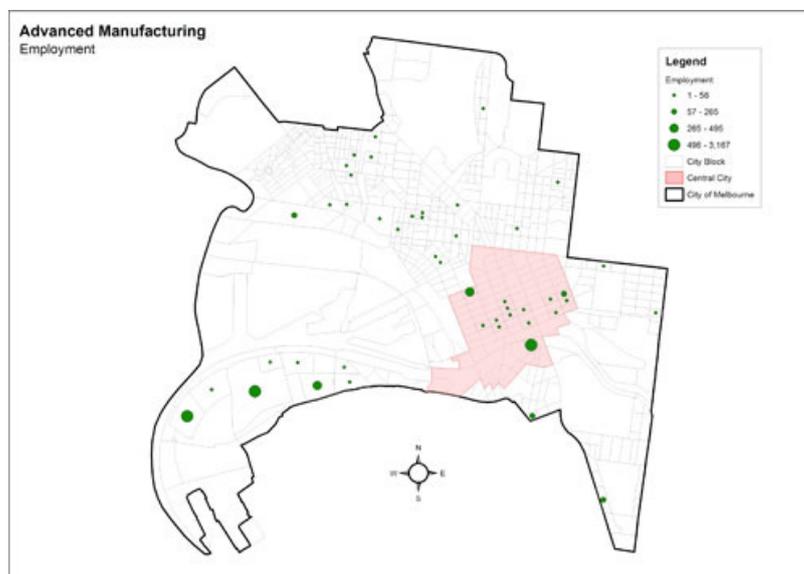

Figure 2: Advanced manufacturing clusters within the City of Melbourne

2.2.2 Monitoring retail activity
The Melbourne Retail Strategy 2006:2012 was launched in 2006 as a joint initiative between the CoM and the Victorian Government, developed to strategically position the CoM as a global retail capital. The continued implementation of the Retail Strategy is reported on an annual basis utilising CLUE data to track changes in retail and entertainment establishments, floor space, employment, venues, capacities and emerging or declining industries.

2.2.3 Individual business locations
Due to the comprehensive nature of the CLUE information, CLUE provides a resource for supporting businesses identify prominent locations. The CoM regularly uses CLUE data to assist businesses in the development of develop business cases and the identification of prominent locations where there are potential customers. For example the CLUE data can be combined with pedestrian counts to identify areas with high employment and consequently a high level of daily street traffic. It can also be used to identify places with high numbers of female employment as a result attracting tailored services such as woman's footwear stores.

2.4 Recycling and rubbish removal

Adelaide City CLUE 2011 data will be used to plan for recycling and rubbish removal in city precincts. Adelaide City Council has undertaken bin audits in Rundle Mall to calculate the volumes and composition of rubbish and materials that could be recycled. Using the information on businesses by ANZSIC from the CLUE 2011 will be used to calculate the likely composition of rubbish and opportunities to encourage recycling. The CoM has also applied a similar approach to predict the volume of rubbish removal which has improved the efficiency of waste collection within the City.

2.5 Metropolitan planning and activity monitoring

More recently the Victorian State Government has trialled VicCLUE trial information for underpinning its planning of strategic areas and the participating local governments have integrated their new knowledge into their place planning, economic management, monitoring and their own forward thinking. The value to businesses and communities is also being recognised for their future as it allows them to see what is happening around them and to put that together with access they now have to spatial applications such as aerial imagery, street view and positioning devices.

2.6 Sustainability Initiatives

Recently, buildings data have been considered for both Federal and State use in energy efficiency initiatives. While this will require some additional information to be collected for best effectiveness, the CLUE approach has the potential to include and link to information related to energy information. A similar approach is possible for water consumption and demand.

3. VicCLUE: The CLUE Data Management System

3.1 Improved system required for expansion of CLUE

In 2008 the DPCD supported a study to assess the feasibility of a Local Government Sector wide roll out of CLUE. As part of this study the CoM ran a pilot in five different council in Victoria covering a variety of land uses including rural, industrial, urban and an activity centre. Overall the project was very successful with over 2,500 businesses surveyed and ten local government and strategic researchers trained in the methodology and use of CLUE. However one of the key findings of this study was that "the 'Stand-Alone' CLUE framework developed for Local Government, specifically its architecture, is unlikely to foster significant adoption across the Local Government sector to provide for State-wide data, however it could fulfil an important gap for those Council's willing to adopt it until such time as a State-wide system can be put in place" (City of Melbourne 2008). The following section provides an overview of the system developed within the Victorian Government, Department of Planning and Community Development (DPCD) which aimed to address the challenges relating to data management and access.
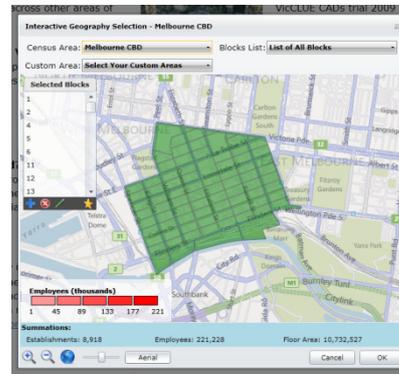
3.2 Development of VicCLUE web access tool by DPCD

To improve the management and reporting capabilities of the CLUE data, an enhanced spatial enablement system has been developed. The system is web based and provides geographic data selection, the generation of standard reports on user-defined geographies and the ability to go beyond standard reports to interrogate the data and shape analysis to suit a wider range of uses . None of these functions requires the user to have either specialist knowledge or specialist software on their desktops. This enables staff in different

functional areas of the one Local Government to access data about their own municipality even where their internal systems may not talk to one another.

This very useable system moves beyond traditional GIS mapping and database management by integrating the two systems onto the one platform. There are four main screens within the system, the functions of which are outlined in the table below.

1. **Area Selection**
   Users can select an area of interest for analysis. In the example illustrated, the areas are based on a block system used to collect data. However, it will also be possible to select properties along streets, or other property level aggregations to produce customised regions. Confidentiality issues arising from such selections are handled within the table generation processes.

2. **Standard Tables:**
   Users can call up pre-designed table layouts whose design is based on the experience of the CoM in answering queries. Users can, however, easily alter the geography (for instance, select a precinct of their choice) and still use the same table layouts to generate comparative tables. These standard requests are able to answer many of the queries of the CLUE data.

3. **Maps:** The property mapping screen provides a mechanism to quickly display CLUE data without the requirement for specialised skills or software. Users can view how land uses cluster together, how ground floors are being used, where vacant spaces are occurring (within or outside buildings) etc. Users can also consider overlays of data from other sources at the same time.

4. **Data Explorer:** The data explorer encompasses online analytical processing that enables users interactively to analyze the CLUE data from multiple perspectives, to create calculated measures and undertake analysis all within the one window.

3.3 How Confidentiality is handled

Within CLUE, data are collected about individual businesses but the information is aggregated for reporting. The data management system uses several mechanisms to ensure that individual data records remain secure. First, contact details and business names are not stored within the database. Second, those wishing to access the data require authorisation (approval by the individual local councils whose data are in the system) to see and work with the data. Without such approval, anyone can see only summarised tables of data. Third, within the table generation system, the user can be allocated only to see confidentialised data. Users working with non-confidentialised data also have the ability to generate confidentialised tables for use in reports. Standard reports which do not contain confidential information are being made available through the VicCLUE website.
https://secure.vicclue.info

4.0 A property Level collection such as CLUE has wider potential

4.1 Measures of Liveability

There is an increasing need for urban data which reflects the spatial dimension in which people live and work (State of Australian Cities 2011). This level of information provides people with insight into the local community. They are able to visually identify the location of potential employment, education, health and community services; as well as social, cultural and recreational opportunities. Due to the property level scale of CLUE data this is a resource which provides a rich information based on how people live and is perfectly integrateable with other data collections at any scale.

4.2 Climate Change

Responding to the challenges of climate change requires information to better inform the way cities are planned, built, governed and managed. The CLUE system includes within the methodology to improve data collected to monitor changes in sustainability. In 2010 the CoM CLUE collection was extended to include attributes such as number of bike spaces and shower facilities. But the potential is even wider. DPCD are conducting a collection of information to identify Urban Heat Islands within Melbourne, and this information will be able to be integrated into the data management system for interrogation through the property level queries. This will contribute to better estimates of how many workers and residents are particularly vulnerable to a run of hot days. Similarly, flood level layers can be added to the system.

 DPCD will also be testing VicCLUE in a regional Shire in anticipation of being able to document current agricultural, horticultural, tourism and other land uses beyond the urban centres. Over time, the way in which those land uses change in response to climate may be better able to be localised. Such a collection will not duplicate the ABS Agricultural Census, but because the ABS data are available only at a more aggregated geographic level, their documentation of response to climate is necessarily of a more general order and not as easily able to be combined with other land use documentation such as Victoria has in its Victorian Land Use Information System.

4.3 Risk Management

Once the VicCLUE data collection has been rolled out to climate-vulnerable areas, it will add value to State and Local emergency services coordination. Recognising the value of small area data the National Exposure Information System (NEXIS) project being developed within Geosceince Australia is currently using the CoM CLUE data to inform risk management and disaster modelling scenarios.

4.4 Urban modelling and forecasting
Urban models are being required to inform the future and create visions of 'how things might be' in conditions such as a sustainable low carbon city (OECD 2011). Often these models are limited by a shortage of data in the model which requires assumptions to be made about how space is used. CLUE data is able to assist with these through the provision of accurate and timely information on where people live, work, how the built space and land is being used filling the data gaps and enabling researchers to explore emerging leads.

4.5 3D Modelling
Data from the Adelaide City CLUE 2011 will also be incorporated into the City's 3D Model. Presently the 3D Model of the City is used to illustrate the impact of proposed buildings in context to other buildings. With land use and employment data the 3D Model will be used to illustrate employment 'hot spots' and generalised land use by building. For Council research purposes there could be more complex use of the data in relation to land use by floor within buildings and identifying floors which have lacking facilities are (ie bicycle parking and shower facilities).

4.6 AusCLUE
In 2010 the CoM developed a project proposal for a Capital Cities CLUE . The main driver for the review was the State of the Cities report in 2010 which identified that, most economic and much demographic data is collected at the state level and minimal knowledge of the detailed land use patterns within cities is available. The review highlighted that Adelaide, Melbourne, Perth and Sydney currently undertake a census with similar characteristics as CLUE. The Perth Census is undertaken by the West Australian Department of Planning and the data is provided to the City of Perth. Sydney's survey is the most comprehensive survey undertaken while Melbourne's is the most frequently performed. The overall process is similar in all states with surveyors physically inspecting each site in the census area and collecting the data from inspection and interviews with representatives of establishments. The only data collected by all censuses in the same way appears to be the Trading Name of the establishment and the address. A degree of concordance with many other data items suggests that there is comparability between the existing censuses. Table 1 provides the frequency and coverage of the current censuses in each of the cities (City of Melbourne, 2010).

City	Coverage	Last Collection	Establishments	Next Collection
Adelaide	Municipality	2008	5681	2011
Melbourne	Municipality and areas of interest	2008	15305	2010
Perth	Metropolitan	2007	6125	2012
Sydney	Municipality	2006	19746	2011

Table 1: Summary of Australian City CLUE Collections (Source: City of Melbourne, 2010).

 The review proposes that the most successful way to develop a national dataset is to concentrate resources on harmonising the existing datasets by creating a standard for how this type of data is gathered and recorded and protocols for pooling or sharing this data. This

requires assistance to be provided to the other cities considering censuses so that they can ensure that any data gathering follows the standards of datasets already developed rather than creating another set of data with different standards.

5.0 Conclusion

Conducting a regular CLUE provides valuable long term information about an areas workforce and the needs of the community. The snapshot in time and time series aspects of CLUE allows research on how land use and economic activities fit together in a broader sense.

The CLUE method provides a framework for the collection, storage and analysis of information pertaining to land use and employment. This data has been used extensively in many inner city local governments such as the CoM and Adelaide City Council for attracting business, planning for renewal and monitoring plans and strategies.

The web access system developed is making the data accessible across government agencies with the ability to integrate with other data sets enabling the data to be used within a number of applications. It is important to recognise that through the process of data integration there is considerable value adding and productivity savings as the data is collected once and used many times.

However to fully maximise the benefit of a nationwide CLUE requires partnerships and innovations to apply the consistent methodology whilst expanding the coverage of the system into a national census of land use and employment.

In conclusion, the CLUE system aims to complement effective data management strategies so that the full potential of data can be realised.

6.0 Acknowledgements

The authors wish to gratefully acknowledge the support of Municipal Association of Victoria (MAV), ebResearch and the City of Melbourne Property Team in the preparation of this paper and the ongoing development of the CLUE system.

To a large degree the success of this project rests with the agencies involved and the collaborations developed with Local Government and businesses from which data is collected.

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