

LAND AND DEVELOPMENT INFORMATION AS A TOOL FOR URBAN DEVELOPMENT AND PLANNING: THE MELBOURNE EXPERIENCE

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Land Use Planning and Informed Decision Making

Land use planning is one of the major tools in managing and planning urban development, and indeed development at regional and national levels. Planning is much more than drawing lines and polygons on a map and then issuing edicts on what can and can't be done in designated areas.

Planning does rely heavily on land use plans with an interrelated series of land use zones, controls, reservations and protected areas. It is difficult to imagine an efficient system that doesn't use these mechanisms. However, not that many years ago in some regional areas of Victoria, planning was to some extent an ad-hoc exercise. There was much reliance on words with maps being produced as needed and not always in a coordinated manner. The recent advances in geospatial information systems (GIS), mapping, aerial photography and satellite imagery provides the ability to present land use controls in an easy to understand spatial format.

Land use planning also relies on tools other than planning schemes to achieve the desired results. These include legislation, policies, financial incentives and disincentives and readily available information. Reliable and useful information not only helps the community, developers and

infrastructure providers make good decisions, it is also essential for developing good policy and legislation. Land and development information, and its use as a tool for urban development and planning in Melbourne, is the subject of this presentation.

The Land and Development Information Unit

The state of Victoria in Australia has a population of 4.7 million people of which 3.4 million live in the capital city Melbourne. While this is small in comparison with most of Asia, the planning and urban development problems and issues are similar. Urbanisation, protection of the environment, encroachment on prime agricultural land, economic development and equity are all matters that have to be dealt with.

A key goal of the government has been the devolution of decision making to local communities while maintaining coordinated development across the state. To achieve this there are 78 local councils and 8 “mega” departments. One of these is the Department of Infrastructure which comprises a number of interrelated functional units. These include land use planning, transport, ports and harbours, strategic infrastructure planning and the coordination of local government. Planning in turn includes statutory planning, policy, legislation, urban design and land and development information. The grouping of major strategic infrastructure functions in one department works well. So does the split in planning between policy development and information gathering and analysis.

The Land and Development Information unit (LDIU), which I manage, provides information on which policy, statutory planning and legislation rely to make informed decisions. Our staff includes professional town planners and we work closely with the policy makers, strategic planners and infrastructure providers. While LDIU gathers data and produces information we always have to be aware of the policy and political implications of what we produce. This doesn't mean that information is withheld, rather that we need to be careful of the comments we make about it. This distinction is

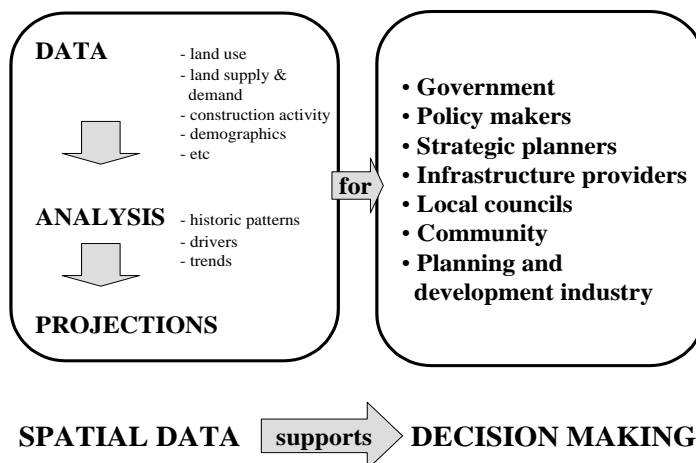
important in ensuring that external sources freely provide data to us and that the information we produce is considered impartial and authoritative. Additionally, in deciding what information we produce with our limited resources we need to consider what information the policy makers might need.

What The Land and Development Information Unit Does

LDIU monitors and forecasts the supply and demand for residential and industrial land in Melbourne. The residential land component has been a core activity for some thirteen years and robust techniques and methodologies have been developed. The monitoring of industrial land started last year and builds on these methodologies.

The information produced includes raw data (e. g. number of dwelling commencements by geographical area), analysis (trends and drivers of change) and future projections. Increasingly we are trying to provide as much analysis as possible to explain what is happening, where and why.

Figure 1. LDIU Information and its users.



Over the next twelve months we intend to expand our activities to the urban fringes and regional areas. We will expand the work on industrial land and look at how we can monitor other development such as commercial and community focused facilities. We are also endeavouring to get a better understanding of built form in housing--from types of subdivision and housing developments to the sizes and configurations of the housing units constructed.

Residential Monitoring and Forecasting

Quarterly Residential Land Bulletin

The “bread and butter” publication of LDIU is the *Residential Land Bulletin* which is produced every three months. This contains the following data for each municipal council:

- ❑ Number of Residential Lots in Subdivision Plans Submitted to Councils.
 - *This is the first step in the supply process for larger developments. Data is provided by councils.*
- ❑ Water Supply Conditions Accepted for Residential Lots.
 - *The second step in the supply process. Data provided by supply authorities.*
- ❑ Certification of Residential Lots.
 - *The third step in the supply process – approval to subdivide land. Data provided by Councils.*
- ❑ Residential Lots Released.
 - *The final step in the land supply process – residential lots released for sale. Data provided by Councils.*
- ❑ Dwelling Approvals.
 - *Approvals to construct dwellings. Data from Australian Bureau of Statistics.*
- ❑ Median Price and Area of Vacant Residential Lots Sold.
 - *This data is provided every six months. Data from the Valuer General.*

The dwelling approval data covers all housing and includes houses built on previously subdivided land and the replacement of existing housing. It also includes the construction of housing on land previously used for other purposes such as industrial sites and no longer needed government facilities. This provides information about the general level of construction.

The subdivision data on the other hand provides information on housing activity in new and developing areas.

All of the data is provided for each local council and is aggregated by areas of interest and the whole of Melbourne. It is graphed on a time series and provides trend indicators. While the data is collected from external sources it is "cleaned up" where necessary and provided in a consistent format. This enables valid aggregation and comparisons to be made. This publication is highly regarded by the development industry as the data is reliable and consistent and as it assembles data for the whole of Melbourne in one place.

Residential Redevelopment in Melbourne

Until recently Melbourne has mainly accommodated population increases by developing new housing on open land at the fringes. This new suburban development has been as far as 60 km from the centre of Melbourne, which is a considerable distance for a city with a population of 3.4 million. A single house has traditionally occupied a block of land 750 sq.m. in area. This development, at a density of 10 dwellings per hectare, has been possible because of the availability of vacant land.

This urban sprawl placed a lot of pressure on the supply of infrastructure such as water, drainage and transport and also began to encroach on environmentally sensitive areas and prime agricultural land. Additionally the residents of these areas were often remote from services such as hospitals and from cultural and recreational facilities.

In common with other major cities in Australia there has been a trend in Melbourne to increased development of new housing in inner city areas. The ratio of new housing in inner Melbourne to outer Melbourne is now about

40:60, while ten years ago it was 15:85. This has been made possible by the redevelopment of land previously used for other purposes and the replacement of existing housing with medium and high density residential developments.

This trend has been largely due to market demand caused by demographic changes. The main changes are the decrease in household size from 3.47 in 1966 in 2.69 in 1996, ageing population and the increase in the number of single and two person households. Lifestyle preferences have also changed with young professionals and others preferring to live close to the cultural and other amenities in the city centre.

Approximately every six months LDIU prepares and publishes the *Residential Redevelopment in Melbourne* bulletin. This contains data on sites with a redevelopment potential of 10 or more dwellings. The bulletin contains the following data for each council:

- ❑ Number of new dwellings in the development process – proposed, at planning approval stage and under construction.
- ❑ Completed redevelopments since 1995.
- ❑ Types of dwellings – stand alone, single storey attached, 2 – 4 storey attached and attached dwellings higher than 4 stories.
- ❑ Number of redevelopment sites and their size.
- ❑ Previous land use – industrial, commercial, education, other government use, local council use, transport, utilities (such as gasworks) and residential.

As with the *Residential Land Bulletin* the data is provided for each local council and is aggregated by areas of interest and the whole of Melbourne. It is graphed and provides valuable trend indicators. The redevelopment data is also mapped with each site identified and detailed information provided about each development where possible.

While the trend to more housing in inner Melbourne is welcomed by government, it is not always welcomed by the local residents, particularly in the more affluent established areas. This is because some of the new

developments have not been sensitively handled and have changed the character of the established areas. Additionally, in some areas, increased traffic and car parking has created problems and existing infrastructure has been stretched.

Larger scale redevelopment of the type we monitor generally has advantages over “infill” redevelopment where one house may be replaced with two or three dwellings. The larger developments lend offer greater scope for innovative design, sensitive interfaces with adjoining properties and better traffic management.

The main value of the *Residential Redevelopment* bulletin is in helping local councils and communities understand what is happening in their part of Melbourne and in adjoining areas. This helps the councils and communities manage the inevitable changes and plan strategically for new housing, particularly higher density housing.

The data is collected from a number of sources which include local councils, Melbourne’s Building Control Commission and private sector data collection companies. The contribution of the bulletin is to gather information for the whole of Melbourne and to analyse and graph trends.

Residential Forecast

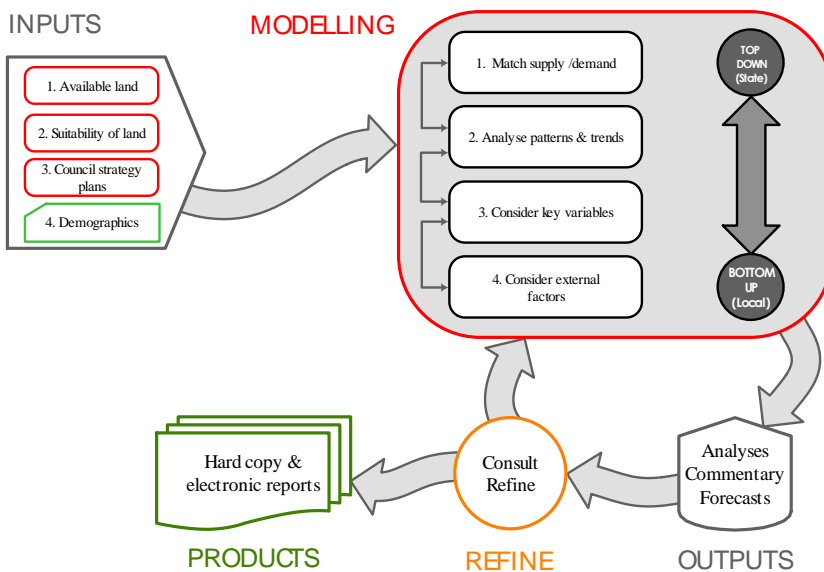
Every three years or so all of the information and “wisdom” of LDIU is consolidated into a major document which provides data, analyses and forecasts for residential development in Melbourne.

These publications have evolved in keeping with the changing patterns of housing supply and demand. The first forecast only looked at land on the fringes of Melbourne. The 1997 forecast for the first time covered all of Melbourne but concentrated on major land releases. The current forecast, to be released in November, is called *Housing Melbourne - Residential Forecast 2000* (RF). As well as providing historic information and forecasts the RF provides background information, such as demographic profiles, and explains the reasons for the changes that are happening.

In addition to the data mentioned above, it draws on many other sources of information. These are discussed later.

The following diagram illustrates the process of monitoring and forecasting residential land supply and demand.

Figure 2. Residential Forecast Process



This is an iterative process which includes among its key inputs demographic data (demand) and land availability (supply). The modelling is a combination of “top down” and “bottom up” processes. The top down approach starts with broad population projections and other data for the whole of Victoria and Melbourne. The bottom up approach starts with local area projections for growth in population and housing. Local groups sometimes underestimate future housing growth as they may wish to stay as they are and not change in character. Conversely some areas may overestimate growth so that they attract more infrastructure services and

funding. While it is not possible to be completely accurate in small area forecasts it is clearly important that the aggregate of small area projections equals accepted wide area projections produced by authoritative groups such as the Australian Bureau of Statistics.

Consultation is a critical part of the modelling process. This is because of the importance of tapping in to local knowledge and of gaining maximum acceptance of the forecasts themselves. Consultation and the refinement of projections is again an iterative process. Consultation is with local councils, developers, infrastructure supply authorities, industry groups, government departments, academics and strategic planners. Local councils are key “stakeholders” as they shape the development of their communities through their policies, strategic development plans and statutory land use plans.

Inputs

These include:

- location and quantity of available land and redevelopment sites
- suitability of available land (location and cost to develop)
- local council planning schemes and strategic plans
- demographic forecasts - numbers, locations, population characteristics.

Modelling

This is an iterative process which includes:

- matching supply with demand - large broadhectare housing developments, redevelopment sites, replacement and infill housing
- examination of trends and development patterns - time frame analyses, market trends and patterns such as mobility of various age groups
- consideration of key variables - major roads, public transport, infrastructure availability and government planning and other policies

- consideration of “external” factors – economic climate, immigration and other global demographic factors, changes in work patterns and the like.

Outputs

The outputs of the modelling are analyses, commentary and forecasts.

Product

The end product is the Residential Forecast 2000 will be published in three forms.

- ❑ A3 technical document.
 - This includes background information and projected timing and location of housing development.
- ❑ CD-Rom.
 - This provides spatial and textual data in an interactive electronic form.
- ❑ A4 background report.
 - This provides “the story” behind the information and forecasts.

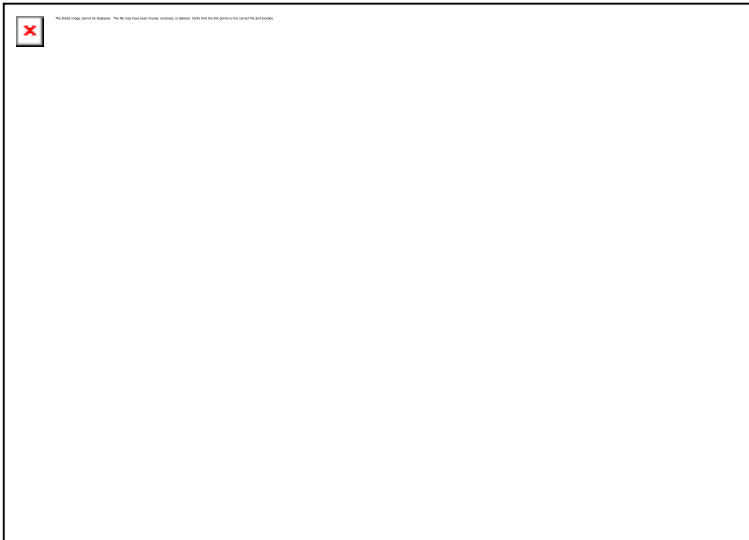
A3 technical document

This provides the information in tabular, graph and map formats. The following information is included for each local council area.

- demographic profile – population and household size in 1996 (last census) and 2011 (forecast)
- profile of area – population, age structure and country of birth, average earnings and employment sectors
- movement of people in to the area
- size of residential lots
- number of dwellings constructed – 1996 and 2011
- housing profile – type of housing, size, number of sales and prices
- housing development in the previous four years
- forecast housing development – short term (1~5 years), medium term (6~10 years) and long term (11 years +).

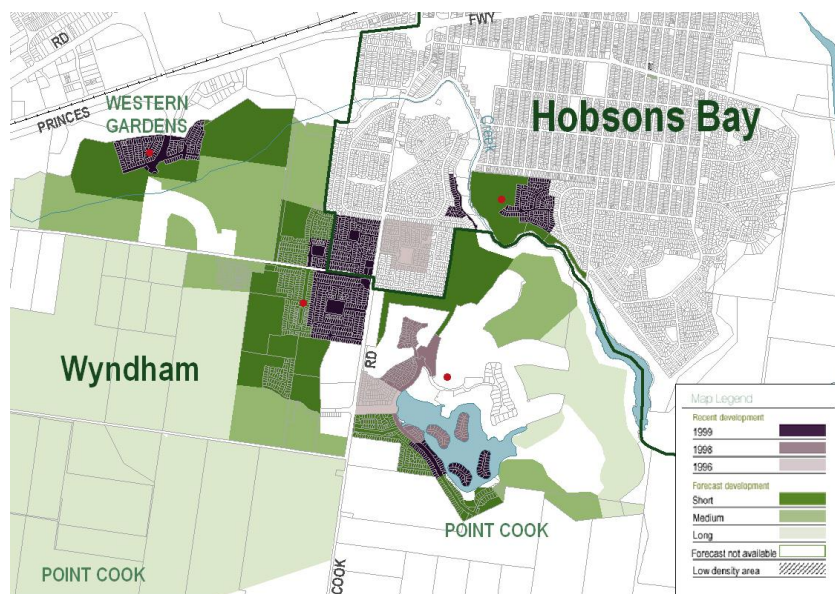
The first part of the information helps understand the nature of each local area and what might cause changes in the future. Some of the information is provided in maps, as in the example below.

Figure 3. Residential Lot Sizes



The core information for each council is the map showing recent and projected housing development. Part of a map is reproduced below. As well as providing site specific information, the visual representation of past and forecast housing activity gives a very clear understanding of where the activity has been and where it is forecast to be. The map is in GIS (MapInfo) format and uses a cadastral base to accurately locate data. The maps are available in electronic format and can therefore be combined with other data sets, such as location of infrastructure services, for detailed analysis in many different ways.

Figure 4. Part of RF Local Council Map



CD-Rom

For the first time LDIU is providing an interactive CD-Rom. This contains key housing data, in GIS and tabular formats. A run time version of GIS software (MapX) is included so that the users can select, combine and interrogate the data.

A4 background report

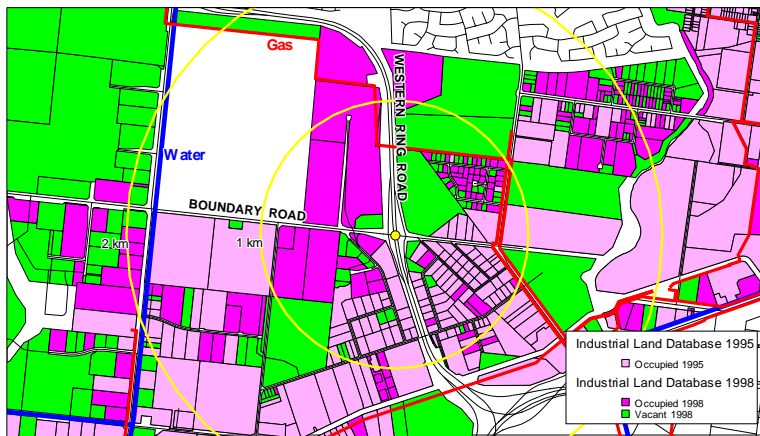
While this is provided with the A3 technical report and CD-Rom as background material it can also be read as a stand alone document. The report discusses how Melbourne has changed and why it has changed. It also summarises housing patterns in Melbourne and describes how Melburnians are likely to be housed in the future.

Industrial Land

In 1999 LDIU expanded its monitoring activities to include industrial land in Melbourne. The reason for this was that the availability of suitably located industrial land is important to Melbourne's economic well being. Previously developed techniques, the availability of digitised aerial photography and the development of GIS software made this a relatively straightforward task.

The first stage of this work was the assessment of the amount of land zoned for industrial use, how much of the land was being used and how much was vacant. The output was the identification of used and vacant industrial land in tabular and map format. Comparisons were also made with the availability of industrial land in other Australian cities. Part of a map is shown below.

Figure 5. Vacant and Occupied Industrial Land



The technique used for industrial monitoring is interesting as it can be used to assess the availability of land for any use which can be readily identified.

- Areas of land where industrial activities are permitted are identified from planning scheme maps.
- These are overlaid in a GIS application on the cadastre (mapped property boundaries) and digitised aerial photographs.
- From a visual inspection of the aerial photographs, properties which have buildings on them or show other indications of industrial use are identified as being used for industrial purposes. All other properties are identified as vacant.

This information is used by government departments concerned with managing industry, and fostering economic development and by infrastructure planners and providers. It is also very useful for local councils for strategic planning and as a starting point for more detailed studies.

A number of Australian cities have carried out industrial land use surveys based on site inspections and detailed surveys. This approach is very labour intensive and therefore means that the data is very costly to maintain current. A more efficient approach is to regularly carry out broad assessments as outlined above and to carry out detailed surveys in areas of particular interest when needed.

The work done so far is the first stage of the industrial monitor. The next steps include the following.

- Identification of industry types in local areas. This will be done by geo-coding "Yellow Pages" telephone directory listings.
- Assessment of intensity of use of industrial land. This will be on the basis of how much of a property is being used.
- Assessment of suitability of vacant land. This will be done by assessing availability of services, proximity to transport, proximity to sensitive areas and physical characteristics of the land.
- Time series analysis of development of industrial land.
- Matching supply to demand.

Ad-Hoc Ldiu Services

LDIU is often called on by other units in the Department and by other government departments for ad-hoc spatial information and analyses.

These have included the following:

- maps showing the extent of developed areas in Melbourne
- maps showing the proximity of housing to potential sites for noxious industries
- maps showing the location of shopping centres and community activity centres
- identification and analysis of potential major residential redevelopment sites.

These requests have demonstrated the powerful analytical capabilities of GIS when it combines a range of data sets. As an example the map below identifies vacant industrial sites within a 0.5km radius of a major interchange on an arterial road linking Melbourne's port and airport and shows the location of nearby housing.

Figure 6. Identification of Possible Sites



Data Sources

Data is drawn from many sources, some of which have already been discussed.

- Planning scheme zones and controls and strategic statements.
- Monitoring of amendments to planning schemes.
- Proposed and approved subdivision of broadhectare land.
- Approvals to construct dwellings and other buildings.
- Sales of land and housing.
- Development of infrastructure services (water, drainage, sewerage, electricity and gas).
- Monitoring of redevelopment for housing.
- Surveys of developer intentions.
- Surveys of owners of land in key areas.
- Aerial photographs.
- Satellite images.
- Transport surveys.
- Demographic data.
- Australian Bureau of Statistics.
- Industry bodies
- Private sector information (development consultants, real estate agents, economic forecasters and others).
- Cadastral data.

Cadastral data can be described as data about properties or land generally in a geospatial context. In Australia cadastral data is largely a product of the land ownership system which registers official titles to land (the Torrens system). Titles to individual parcels of land, properties, are registered centrally. These are mapped and are available in GIS form.

The cadastre is a key tool for LDIU. It provides an accurate map base for our published information and is also used to locate features on aerial photographs. It has several other advantages. As each property is identified

and mapped we can derive a lot of information from it, for example the size of properties and the length of frontages. Analyses we have done on property characteristics have been important to policy developers in considering residential planning controls such as permitted housing densities. As the properties in the cadastres are individual polygons we are increasingly using the ability to attribute or relate new data to each property rather than creating new polygons.

In gathering data consultation is very important. There is no substitute for talking to people who collect data and understand what it means. Conversely the better people understand what data is requested, the more likely it is that useful information is obtained. Additionally people supplying information are far more likely to be helpful if they understand what it is to be used for.

Users Of Information

The information that LDIU produces is generally at a broad strategic level. Its prime users are therefore those involved in strategic decision making and policy development. The information is also a good starting point for those who want to undertake more detailed studies. Information users, or clients, include :

- strategic planners and policy makers in government departments (planning, transport, housing, education, state development etc.)
- infrastructure and utilities providers (water, drainage, sewerage, electricity and gas)
- transport providers (train, tram and bus)
- local councils
- community groups
- land developers
- land and development industry professionals
- businesses (manufacturers, retailers and service providers)
- economic forecasters

- academics.
- The spatial land development information is often used in conjunction with demographic data.

Format of Information

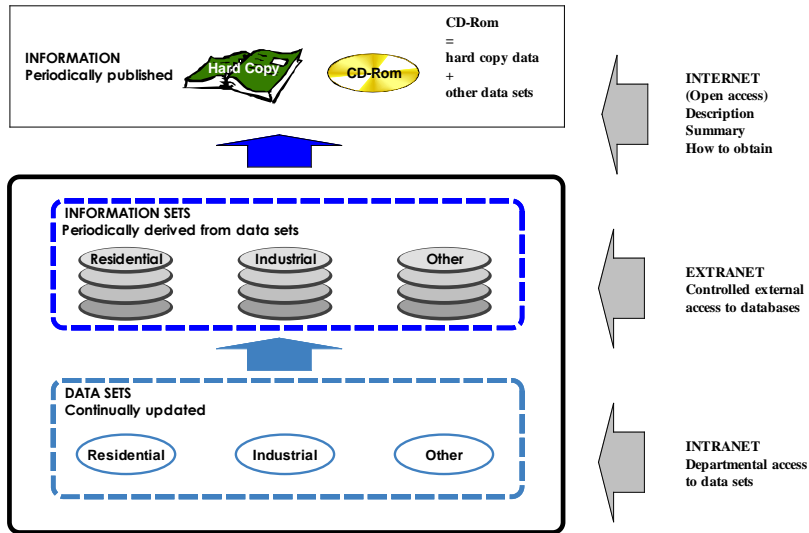
The prime purpose of LDIU is to provide information. It is therefore important that the information produced is in a form that is readily understood and used. As noted information is increasingly provided in a spatial format using GIS maps which supplements tabular and graphical data.

As far as possible the format is tailored to the needs and capabilities of users. The information is always available in hard copy format as this is accessible to everyone and is often preferred by senior managers.

Electronic versions of data are provided to analysts who may wish to combine our data with their own or who may wish to manipulate and analyse our data in different ways. Up until now this has been provided direct to users in the native formats (GIS, spreadsheets and databases). Increasingly the data will be made available on the Internet and on Intranets. For intermediate level users we will provide data on customised CD-Roms which will be accessible by standard software and browsers and run time GIS software included with the CD-Rom.

Internet and Intranet access will provide access to sets of data as soon as they are produced, without having to wait for data to be assembled and published in hard copy and CD-Rom publications. The timely availability of data is becoming increasingly important.

Figure 7. Format of Information



Closing Remarks

The work of the Land and Development Unit has been determined by the needs of government and the development industry in Melbourne and by the data available. The approaches and techniques used should however be adaptable to different circumstances in different parts of the world.

The general principles of information and knowledge management and the importance of aligning information with the needs of its users are universal. The importance of having the best information available to all concerned with urban development and planning can not be overstated.

Twelve months ago, two conferences sponsored by the United Nations Department of Economic and Social Affairs, Division for Sustainable Development and the International Federation of Surveyors (FIG), were held in Australia on the theme of "Land Tenure and Cadastral Infrastructures for Sustainable Development". The *Bathurst Declaration on Land Administration for*

Sustainable Development resulted from the first conference. Significantly it focused strongly on the importance of people in thinking about land – they should be at the core of any land related policies and systems. The second conference, held in Melbourne in October 1999, was equally interesting. Presenters from all over the world talked about their experience in developing spatial land based systems. Practical applications are being developed in a wide range of social, physical and political environments using all manner of data. Details of the conference and the *Bathurst Declaration* can be accessed at <http://www.sli.unimelb.edu.au/UNConf99/proceedings.htm>.

In the information and I.T. revolution, more and more possibilities are opening up. In particular, rapid advances in geospatial information systems make it increasingly easy to analyse and present information in innovative and useful ways. If cadastral data is not available, other forms of spatial data and maps can be used. Simple maps can be created if necessary and progressively refined.

In Melbourne we are lucky in having a lot of data available. Even so we are constantly having to find new sources of data and find ways of deriving information of interest to us from data collected for other purposes. Satellite images may be easier to obtain than aerial photos. Scanned photos may be suitable for pictorial images which could help strategic planners understand maps and tables of data. Finally, information systems can be developed progressively as resources and data become available. All that is necessary is a clear understanding of what is needed by the decision makers managers and the communities they serve.