TRENDS IN LAND INFORMATION SYSTEM ADMINISTRATION IN AUSTRALIA

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ABSTRACT

Current land information system (LIS) activities and trends, at the Commonwealth, state and local government levels in Australia, are briefly reviewed. The reasons for the pre-occupation with parcel (cadastral) data are discussed while recognising that the challenge for the next decade is the integration of resource, environmental and soci-economic data into parcel-based systems. LIS models are reviewed with particular emphasis on LIS administration in the Australian context.

INTRODUCTION

Reforms in the cadastral and land information system (LIS) areas have been occuring at an increasing rate in Australia during the last decade. By necessity the reforms have been directed almost solely at the parcel based areas and have been centred around major institutional and administrative reforms.

It is fortunate that Australia has well developed systems for land registration, and cadastral surveying and mapping. By comparison with many other countries, Australia's government institutions for administering these systems are extensive and well established. Such systems, together with the associated institutional arrangements, form the foundation for the present LIS initiatives in Australia.

The reasons for the present reforms are many and diverse, and include:

- an increasing requirement of governments and government departments to be more effective, efficient and accountable;
- the trend to rationalise existing cadastral arrangements to better meet the needs of a modern LIS;
- the impact of advanced technology on the collection, storage, manipulation and display of digital, spatial, land-related data;

- an increased environmental awareness by society and governments in general, which has resulted in a requirement for more complete and up-to-date data about land; and

- a general trend for governments to demand better and more timely information for decision making.

Within this context, this article briefly reviews LIS activities in Australia at the three levels of government, namely the Commonwealth, state and local levels, together with the efforts being undertaken by the utility and service authorities. While recognising that "land administration" is a state responsibility in Australia, the general administrative arrangements for LIS in the states are discussed. In conjunction with this discussion, trends in LIS are outlined. Even though most efforts in Australia are directed at parcel-based LIS, considerable thought and effort is being expended on integrating resource, environmental and socio-economic data into a broader LIS. The paper reviews the present pre-occupation with parcel-based data and looks at efforts to integrate these other forms of data. Theoretical and applied LIS models are briefly discussed.

For a general overview of LIS activities in Australia, reference should be made to the Report of the Working Group on Statewide Parcel-Based Land Information Systems in Australasia (Williamson, 1985a).

LIS ACTIVITY IN AUSTRALIA

Since "land administration" is the responsibility of the States in Australia, most activities in the LIS area have been traditionally undertaken and initiated by the respective state governments. On the other hand, the Commonwealth Government is becoming increasingly interested in specific land-related information and at the level below state governments, local governments, and utility and service authorities are rapidly establishing LIS and facility information systems (FIS) respectively.

Commonwealth Government

In 1983 a Commonwealth Inter-Departmental Steering Committee was established to investigate ways and means of implementing co-ordination of land-related information within the Commonwealth Government. At the instigation of the Prime Minister, a National Conference was held in 1984 endorsing the co-ordination of Commonwealth land-related data and the compilation of a directory of such data. As a consequence a National Co-ordination Committee on Land Information Exchange was set up, comprising the chairmen of existing Commonwealth, state and territory land information system

steering committees to plan, develop and promote a national strategy. A full-time Commonwealth Land Information Support group was established in the Australian Survey Office in 1985. Its tasks include the updating and maintenance of the LANDSEARCH Directory, the first edition being published in late 1985.

State Government

During the last decade each state or jurisdiction in Australia has developed or has commenced developing a LIS strategy. A central component of these strategies has been the establishment of some form of LIS support group or unit. The primary role of these units is co-ordination and advice. They are established in a range of different administrative structures and have different responsibilities and levels of authority (see following section).

The major LIS activities at the state level are:

- establishing a COMPLETE inventory of land parcels, each parcel being identified by a unique identifier;
- establishing a graphic data base or digital cadastral data base (DCDB) to complement the textual data base of the above parcels;
- improving the conveyancing/land registration and cadastral surveying/cadastral mapping systems to update the above parcel data;
- establishing a centralised policy and decision making unit to direct LIS developments;
- developing standards for the exchange of textual and spatial data, and nomenclature;
- understanding existing systems and quantifying user needs;
- preparing a land information directory.

Local Government

There is considerable awareness and activity at the local government level concerning LIS developments. It is becoming increasingly recognised that local government is one of the major growth areas for LIS applications. In a sense this is obvious considering the vaste amount of land-related data that is created and maintained at the local government level. From a practical view point, the most desirable way to maintain the integrity of data is to update it at its source. In a statewide LIS this means a major input by local government. In the Australian context this will see the state systems giving overall co-ordination, setting standards, providing

basic parcel data in the form of ownership data and spatial data (cadastral maps/DCDB) and in providing digital topographic data. The state systems may also be involved in collating and processing socio-economic, resource and environmental data for specific user needs.

In Australia there are over 30 local government organisations which are committed to a LIS strategy. In general these organisations manage upto 100,000 parcels with populations of upto 500,000 persons. The systems vary greatly in sophistication and design. Some have a strong emphasis on land information management, financial management, corporate planning and land administration, while others emphasise graphics and CAD. Some systems are only textual or graphic, while others are a combination.

Systems utilise IBM, Intergraph, Prime, Digital and ICL systems. They use such packages as GDS from ARC Cambridge, Easinet etc., for graphics and INFO, PICK and CODASYL for the data base management system. In addition there has been considerable experimentation in the smaller organisations with micro computers for both textual and graphic applications.

Utility Authorities

In one sense the utility authorities have taken the lead in applying the latest technology in developing facility information systems (FIS) in Australia. Since these organisations tend to be self funding and more autonomous than local or state governments, they appear to have had more access to funding.

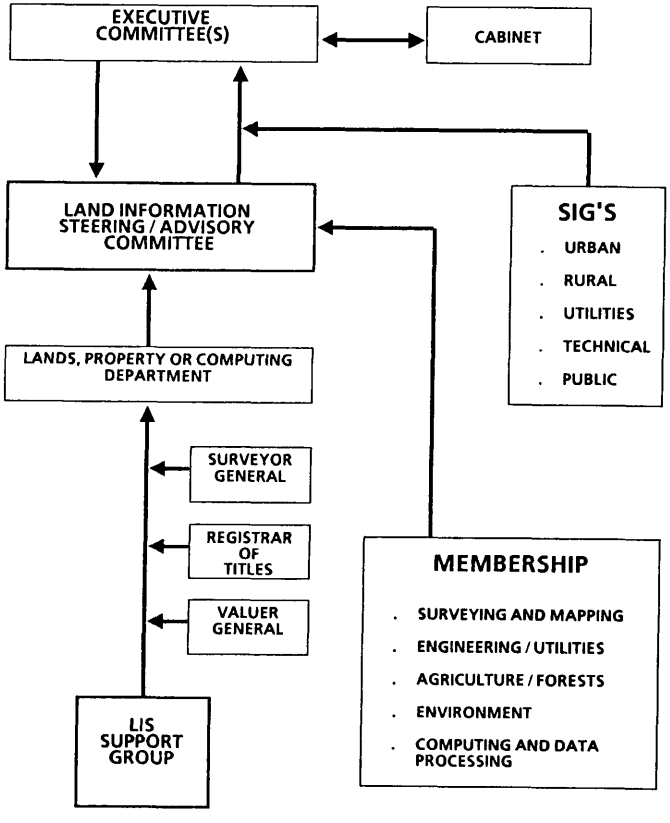
Two examples of such authorities are the Sydney Water Board and the Melbourne Metropolitan Board of Works. Both organisations serve over one million properties. Both are developing sophisticated FIS with extensive and flexible, textual and graphic data bases. The Sydney Water Board is developing its system around the IBM IFIS and the Melbourne system around Intergraph.

TRENDS AND ADMINISTRATIVE ARRANGEMENTS FOR LIS

As mentioned, the overall co-ordination of LIS activities in Australia generally falls upon the states. The Commonwealth Government does have a co-ordinating role to some extent although its efforts are directed primarily at Commonwealth land-related data. The local government and utility authorities in general take their direction from the respective state government although they are virtually autonomous within the constraints of their legislative mandate.

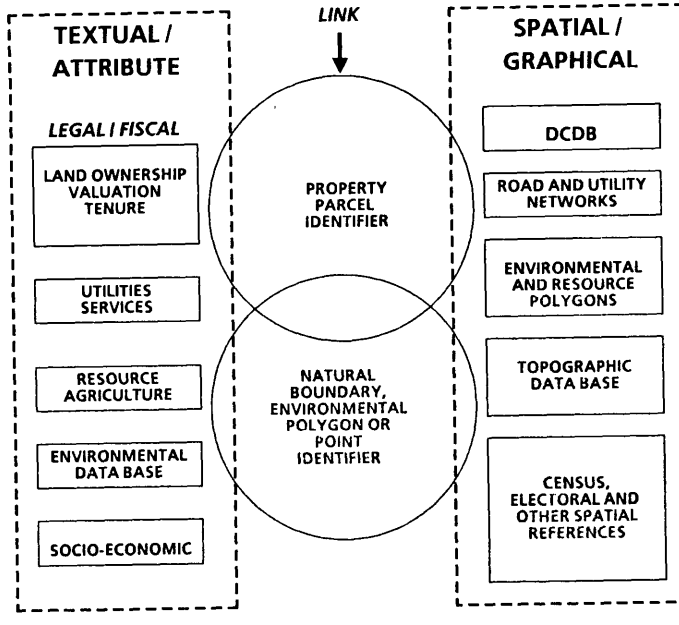
Even though no two administrative LIS structures are the same

in the Australian States, there is considerable commonality as shown in Figure 1 which depicts a general administrative infrastructure for LIS in Australia and in Figure 2 which depicts in schematic form the generalised concept of LIS in Australia (Source: Williamson and Blackburn, 1985).



GENERAL ADMINISTRATIVE INFRASTRUCTURES IN LIS IN AUSTRALASIA

FIGURE 1



SCHEMATIC OF GENERAL LIS CONCEPT IN AUSTRALASIA

FIGURE 2

The major effort in Australia over the past decade has been establishing "complete" textual and spatial data bases of land parcels in the respective state or jurisdiction. In creating these data bases, most States have started with an existing valuation base. By linking the computerised valuation roll into the title registration system, the integrity of the data is gradually increased. To some extent the development of the textual data is undertaken seperately from the development of the spatial component in the form of a DCDB. In general this is the approach taken by South Australia, Queensland, Victoria and Tasmania. Western Australia (and the planned initiatives in New South Wales) are placing more or at least equal emphasis on the spatial component (cadastral survey and mapping). The Northern Territory and Australian Capital Territory are also placing equal emphasis on the textual and spatial side, however, in these cases the basic cadastral mapping is in general complete, the result being that the creation of a DCDB is not as critical.

It should be recognised that even though many states have

developed or are developing LIS, this does not mean that the systems are complete in the sense of a modern cadastre. For example South Australia's LIS does not as yet provide for a spatial component, other than by reference to existing charts or cadastral maps which themselves do not give complete coverage (however a DCDB is being developed). Ideally every parcel or piece of land on a cadastral map should have a unique identifier which has a corresponding series of records in associated registers (according to the basic cadastral concept), however in most states this has not been achieved.

From an institutional or administrative point of view, two trends have been evident in Australia over the past decade. The first concerns the centralisation of the administration of land-based departments and the second concerns the establishment of LIS administrative structures.

With respect to the centralisation of land administration, all States have taken slightly different approaches. Prime examples of this are Victoria and South Australia. In Victoria, the major parcel-based systems are now combined into the Department of Property and Services. This Department includes:

- LANDATA (the Victorian LIS unit)
- Division of Survey and Mapping
- Titles Office
- Valuer General's Office
- Government Computing Service

The natural resource based systems are all combined into the Department of Conservation, Forests and Lands.

In South Australia, the present Department of Lands incorporates the offices of the Registrar-General, Surveyor-General (including the State mapping function) and the Valuer-General. It also includes the Land Operations Division which is responsible for all Crown lands management, and the Land Information Unit which has the role of overseeing all LIS development in the State.

Another example of this trend is N.S.W. where the Department of Lands (within the Ministry of Natural Resources) includes:

- Land Titles Office
- Crown Lands Office

. Central Mapping Authority

. Western Lands Commission

. State Land Information Council

Some problems arise in New South Wales because the Valuer General is in another Department and that the cadastral mapping function in the State is poorly co-ordinated.

In general, these administrative developments are following a trend towards moving closer to the modern cadastral concept (Williamson, 1985b).

Whereas all initial LIS developments were directed at parcel-based land administration systems, all LIS strategies have adopted a broad definition of land information to include natural resource and socio-economic data. The linking of such data to the parcel-based systems is potentially the biggest challenge facing LIS. The overall model now developing for the total LIS of the future is a "dynamic information network".

INTEGRATION OF PARCEL-BASED AND RESOURCE/ENVIRONMENTAL DATA SYSTEMS

As mentioned one of the biggest challenges of the next decade will be the integration of parcel-based and resource/ environmental data into a LIS. This integration is the basis of much of the discussion about the role and form of LIS and GIS. Within such discussions it must be realised that in general the two systems have quite different data sets. Some of the differences are as follows:

Parcel-based data (LIS)

. usually large scale

. polygon data defined by discrete vectors

. polygons dynamic and require a very high degree of accuracy and integrity

. maintenance of polygon data base part of large administrative institutions heavily controlled by legislation

Resource/environmental/socio-economic data (GIS)

. usually small scale

. often grid-cell data

- boundaries of data sets are usually statistical
- boundaries of data sets are usually not dynamic
- high integrity of data usually not necessary
- usually incorporate less structured systems for data maintenance

All states in Australia have recognised the need for the integration of resource/environmental/socio-economic data into a broad LIS, but few major developments have been achieved in this direction. Western Australia and Queensland however, have undertaken some interesting pilot studies integrating such data using complex polygon processing packages. South Australia on the other hand is the only state that has developed a model to incorporate environmental/ resource and socio-economic data into the South Australian Land Information System using a nodal approach (Figure 3), as described by the South Australian Government:

> "Today the LIS is viewed as a series of procedures and standards that allow for the integration of land-related data from a variety of individual systems (whether digital, manual or graphic) that form the State's corporate data resource. Conceptually the total LIS can be viewed as consisting of four major data bases and a myriad of peripheral systems. These primary data bases are:
>
> - Legal/fiscal
> - Geographic
> - Environmental
> - Socio-economic.
>
> This "nodal approach" is seen (in South Australia) as an effective balance of the centralised/ decentralised concept and the most practical and cost effective method of achieving an integrated system". (South Australian Department of Lands, 1985)

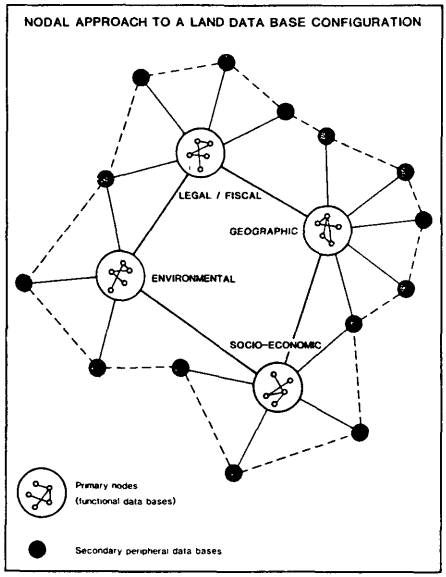


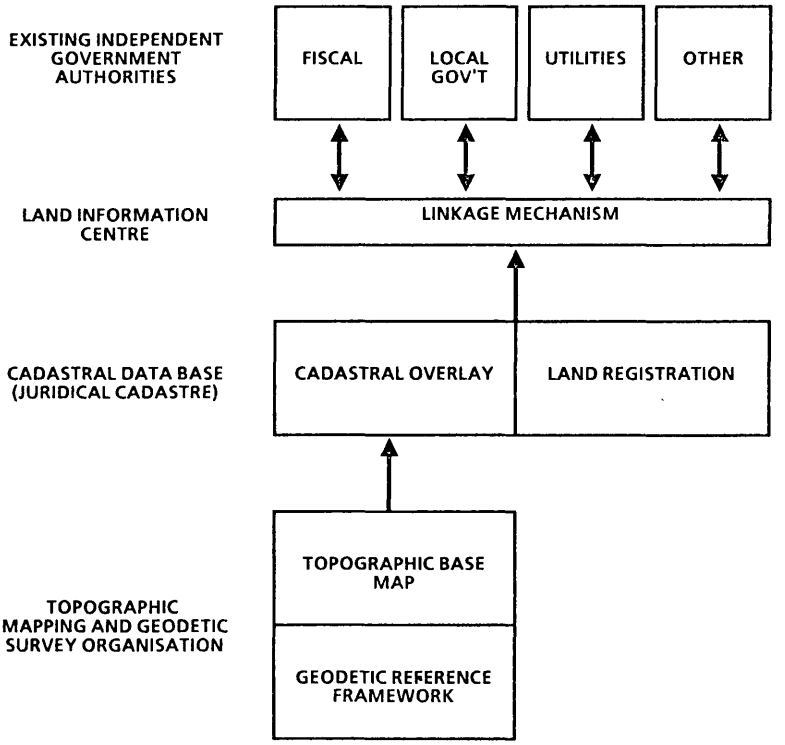
FIGURE 3

On the other hand it must be recognised that in the land administration area, parcel based data is the foundation of the LIS, particularly for state government, local government and utility authorities, as reinforced by the Western Australian Land Information System (WALIS):

> "The results of the questionnaires have already reaffirmed that all areas of the WALIS community continue to recognise that the Legal and Graphic cadastres are the foundation upon which they can build their land management function". (Hyde, 1985)

LIS MODELS

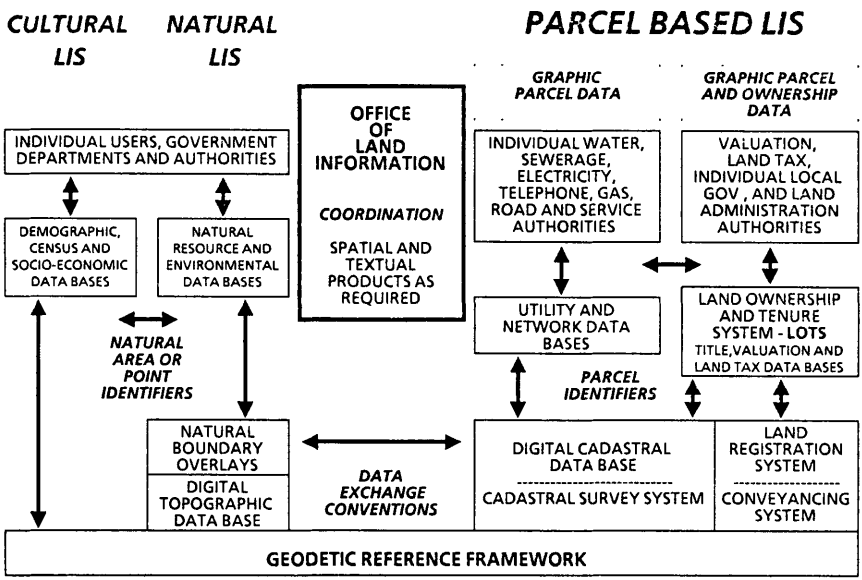
Over the years many theoretical LIS models have been proposed (Williamson, 1983). Unfortunately many do not recognise the very important and central role that cadastral parcels play in the land administration process. In addition most do not recognise the fundamental role that cadastral surveying/ cadastral mapping and conveyancing/land registration play in the maintenance of the parcel based component of a LIS. Following is a generalised model for a parcel based LIS (Figure 4) which incorporates these principles.



THE CADASTRAL COMPONENT OF A STATEWIDE LAND INFORMATION SYSTEM

FIGURE 4

The most crucial challenge however, is applying such models in the real world. Figure 5 shows such an attempt with regard to the South Australian Land Information System.



A SCHEMATIC MODEL OF THE SOUTH AUSTRALIAN LIS

FIGURE 5

CONCLUSION

The land information system concept has been embraced by the three levels of government in Australia, namely Commonwealth, state and local government, in addition to the utility authorities. All states have developed a LIS strategy and introduced administrative arrangements to manage the statewide LIS. In general, the states recognise the equality of the textual and spatial components in such systems. It is the role of the state to co-ordinate most LIS activities since the state has constitutional, legislative and consequently administrative control over land matters. As a consequence LIS initiatives have been most evident at this level although it is recognised that local government, as a major user and contributor of land related data, is a growth area for LIS developments.

Australian land information systems are predominately parcel-based. In many cases they have grown out of valuation systems alghough they are now usually maintained within the "legal" parcel system. This development is similar to the European trend over the last century for cadastres to develop

from a fiscal to legal focus.

The Commonwealth and most state systems recognise the need to integrate environmental/resource/socio-economic data into a LIS. However, the parcel based systems are still the major driving force behind all LIS developments in Australia. The integration of these different forms of data is one of the major challenges in the future.

Australia has had much experience over the last decade in establishing operational LIS systems (see Williamson, 1985a). Interestingly the vaste majority of problems encountered in developing such systems have not been technical but people related. Institutional and administrative problems have been the major limitations in establishing useful land information systems which serve the needs of the community. In general, however, Australia has made many positive achievements in the LIS area, particularly regarding the successful establishment of LIS administrative/co-operative structures. In this regard Australia has valuable experience to offer other countries or jurisdictions heading down the LIS path.

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