THE CADASTRE AND THE EMERGING LAND INFORMATION SYSTEM IN SOUTH AUSTRALIA: SOME ADMINISTRATIVE ASPECTS

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A modern cadastre is defined and the relationship with the wider concept of land information system is established. A generalized approach to cadastral and land information systems in Australia is discussed. The experience of administration of cadastre and the emerging land information system in South Australia is examined and a conceptual model aimed at improvement is presented. The paper concludes with a recommendation for the creation of an Office of Land Information that would administer the operation of a complete LIS for South Australia.

Un cadastre moderne est défini et la relation avec le concept plus général de système d'information foncière est établi. Une approche généralisée aux systèmes cadastral et d'information foncière de l'Australie est présentée. L'expérience de l'administration du cadastre et du nouveau système d'information foncière de l’Australie du Sud est examiné et un modèle conceptuel orienté vers le progrès est présenté. L'article se termine avec une recommandation pour la création d'un Bureau d'information foncière lequel administrera l'exploitation d'un système d'information foncière complet pour l'Australie du Sud.

INTRODUCTION

The raison d'être of earlier cadastral systems was land taxation levied on the basis of the land parcel. Since each proprietary unit had to be dealt with directly by the taxing authority it was essential for the latter to have accurate and detailed "information" related to individual parcels and their owners. Indeed, the management of the acquisition, presentation and manipulation of such land information was and remains the keystone of cadastral administration in France and other European countries whose land administration is built on the Napoleonic model of cadastre. Contemporary administrations in these countries tend to administer the cadastral components, namely survey, land registration and valuation within one organization or at least within one ministry.

In Britain and in countries that have inherited the "common law system", the true fiscal cadastre on the Continental lines has never developed. In these "common law" jurisdic-
tions, “cadastre systems” as opposed to “cadastres” have developed. These are mainly concerned with conveyancing, registration of title to and the survey and mapping of the boundaries of land parcels [Williamson 1985a]. Valuation is generally peripheral to registration and surveying and all three of these major cadastral components are often separated geographically and administratively in such a system.

A number of authoritative studies [Dowson and Sheppard 1956; Toms 1976; Williamson 1985a, b] have addressed the problem of defining a modern cadastral with differing results. For the purposes of this paper Williamson’s definition will be adopted as set out below:

A cadastral is a public register usually recording the area (and spatial location), value and ownership of land parcels in a country or jurisdiction. It is usually concerned with fiscal or legal parcel-based records. This may be expressed as a marriage of:

• a technical record of the (land) parcellation — a map;
• a documentary record;
• an index linking the two.

Essential elements of a modern cadastral are:

• large-scale maps;
• registers;
• the cadastral must be complete;
• each parcel must have a unique identifier;
• the cadastral must be dynamic;
• information must be correct;
• information must be public;
• the cadastral must be supported by a coordinated survey system;
• the cadastral must include an unambiguous definition of parcel boundaries in map form and on the ground supported by cadastral surveys [Williamson 1985a].

Clearly, the register and maps of the modern cadastral will contain a vast quantity of land-related information.

In common with Cadastre, definitions of a Land Information System (LIS) are to be found in abundance. A common thread in all is the notion of systematic compilation of relevant land-related data in a region as a basis for land administration. In its total form, for the purposes of this paper an LIS may be defined as:

A tool for legal, administrative and economic decision-making and an aid for planning and development which consists on the one hand of a data base containing spatially referenced land-related data for a defined area, and on the other hand, collection, updating, processing and distribution of the data. The base of a land information system is a uniform spatial referencing system for the data in the system, which also facilitates the linking of data within the system with other land-related data [Williamson and Blackburn 1985].

Where then does the cadastral fit in with the concept of LIS? Two general types of land-related data are identifiable. First, there are data that describe natural phenomena such as vegetation, ground slope and so forth. Such information can be generally categorized as “environmental”. Secondly, there exists a category of data that can be defined as
"parcel-based" information. In this sense "parcel" can be defined as "... the smallest registered unit of land, continuous in both area and ownership, and capable of being separately conveyed. If the requirement for continuity and separate conveyancing conflict, continuity shall prevail" [Sedumary 1983]. Since the prime unit of the cadastre is the parcel, it follows that the cadastre must form an important part of the wider LIS. In fact it can be said that the cadastre will form the foundation stone of the land information system.

In their landmark study of land registration (an integral component of the cadastre) Dowson and Sheppard [1956] stressed that the control and administration of the cadastral survey (and mapping) and registration operations must be vested in the "central government". Since, in the Australian federal system the state governments hold (under the Constitution) the residual power of land administration, the "central government" must be the respective state government.

The "central government" must assume responsibility for the sure, uniform and impartial working of such a system. The administrative procedures adopted should ensure, inter alia, security of custody of documentary records, ready access to such records in public offices and continuous updating and regulation of cadastral practice.

Because of the structural relationship between the cadastre and the wider land information system, it follows that the same procedures should be adopted for LIS development.

No government has succeeded as yet in creating a perfect cadastre on which to construct a perfect LIS. Reforms, however, are being considered by the various Australian jurisdictions. This paper briefly reviews them. The experience of administration of the development of cadastre and LIS in South Australia is then examined in detail and a conceptual model for improvement is presented. To administer this new system the formation of a new statutory authority is proposed.

CADASTRAL AND LAND INFORMATION SYSTEM REFORM IN AUSTRALIA: A REVIEW

Cadastral and LIS reforms have been progressively taking place in Australia for nearly a decade. The reforms have been generally concerned with establishing in the first instance a complete computerized data base of land parcels and associated ownership and valuation details, in each state or jurisdiction. Secondly, and sometimes concurrently, the establishment of a spatial component has occurred, based on a cadastral map or a digital cadastral data base (DCDB). These improvements have concentrated on technical issues and on institutional reform. To date, the basic processes that produce the parcel data, such as cadastral surveying and land registration have not generally been subject to reform. Exceptions have been automated land titles in New South Wales and moves toward a coordinated cadastre in South Australia.

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

- an increasing requirement of government and government departments to be more effective, efficient and accountable;
- the trend to rationalize existing cadastral arrangements to better meet the needs of a modern land information system;
- 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 by governments to demand better and more timely information for decision making.

The major initiatives for reform in the land administration area, in all states and jurisdictions in Australia, are concerned with LIS [AURISA 1985]. Figure 1 shows the general administrative infrastructure for LIS in Australasia while Figure 2 depicts in schematic form the generalized concept of LIS.

As mentioned previously, the major effort has been in establishing 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 computerized 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 separately 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, ACT and New Zealand 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 recognized that even though many states (such as South Australia) 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. Ideally every parcel or piece of land on a cadastral map should have a unique identifier that has a corresponding series of records in associated registers (according to the basic cadastral concept).

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

With respect to the centralization 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.
The Cadastre and the Emerging Land Information System in South Australia

![Diagram of LIS governance structure with labeled components: Executive Committee(s), Cabinet, Land Information Steering/Advisory Committee, Lands, Property or Computing Department, Surveyor General, Registrar of Titles, Valuer General, LIS Support Group, SIG'S (Urban, Rural, Utilities, Technical, Public), Membership (Surveying and Mapping, Engineering/Utilities, Agriculture/Forests, Environment, Computing and Data Processing).]

GENERAL ADMINISTRATIVE INFRASTRUCTURES IN LIS IN AUSTRALASIA

(Source: Williamson and Blackburn 1985.)

Figure 1
SCHEMATIC OF GENERAL LIS CONCEPT IN AUSTRALASIA

(Source: Williamson and Blackburn 1985.)

Figure 2

As will be discussed in detail below, 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 New South Wales where the Department of Lands (within the Ministry of Natural resources) included in 1985:

- 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 the cadastral mapping function in the state is uncoordinated. Very recently (1986) the Land Titles Office has been relocated in the Attorney-General's Department.

In general, though, administrative developments are following a trend toward moving closer to the cadastral concept outlined in a previous section of this paper.

Concerning LIS administrative structures, every state and jurisdiction (with the exception of the ACT) has established some such structure. The general approach to administrative arrangements is shown in Figure 1. LIS administrative or support groups are usually set up in the major land-related department. For example:

- N.S.W. has the State Land Information Council in the Department of Lands;
- Victoria has LANDATA in the Department of Property and Services;
- South Australia has the Land Information Unit in the Department of Lands;
- New Zealand has the LINZ Support Group within the proposed new Department of Survey and Land Information.

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 socioeconomic 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" [Williamson 1983].

PUBLIC ADMINISTRATION OF THE CADASTRE AND LAND
INFORMATION SYSTEM IN SOUTH AUSTRALIA —
PAST AND PRESENT

Pre-1976

The administration of crown land cadastral surveying and mapping in South Australia commenced with the original colonization in 1836. It was effected through the surveyor-general in the early years followed by a number of designated government departments as shown in Table 1.

<table>
<thead>
<tr>
<th>Epoch</th>
<th>Administrative Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1837–1843</td>
<td>Office of the Surveyor-General</td>
</tr>
<tr>
<td>1844–1857</td>
<td>Survey and Lands Department</td>
</tr>
<tr>
<td>1858–1916</td>
<td>Surveyor-General's Department</td>
</tr>
<tr>
<td>1917–1929</td>
<td>Lands and Survey Department</td>
</tr>
<tr>
<td>1930–1975</td>
<td>Survey Division, Department of Lands</td>
</tr>
</tbody>
</table>

(Source: South Australian Department of Lands 1977.)

From 1859 onward the Surveyor-General's Department and its successors also administered the Licensed Surveyors Act 1859 and subsequent legislation that regulates the professional practice of cadastral surveying.

In the area of land registration, there has been since 1841 a General Registry Office in South Australia administered by a registrar-general. Amongst other documents the Gen-
eral Registry Office has recorded and still does (in comparatively small numbers) register instruments relating to interests in land parcels under the Registration of Deeds Act. Subsequent to the introduction of the Torrens System in 1858, the registrar-general has administered both the legal and surveying aspects of the Real Property Act 1858 and its successors [South Australian Department of Lands 1977].

Prior to 1968, valuation of land parcels in South Australia was carried out by various Departments for various purposes. As far as land taxation per se was concerned there existed the Land Taxes Department, the function of which was "... to determine unimproved land value of all taxable land and assess and collect taxes on such land" [Deputy Commonwealth Statistician 1966]. In 1968 these responsibilities were split between the new Departments of State Taxes and Valuation. The valuation role (determination of improved value for water-rating) of the Engineer and Water Supply Department was transferred to the new Valuation Department [Deputy Commonwealth Statistician 1968].

The first move in South Australia toward the establishment of a State LIS resulted from a Public Service Board study when the government approved the development of the Land Ownership and Tenure System (LOTS) in 1974. This was to be the first stage in the development of a comprehensive LIS for South Australia. The Department of Lands and the Public Service Board jointly administered the design and development of LOTS over the period 1974 to 1976 [South Australian Department of Lands 1977].

Prior to 1977 ministerial responsibility for the separate cadastral administrations was varied as shown in Table 2. The table also highlights the "mixed-bag" approach in Australian state governments to the allocation of portfolios.

The 1976 Re-organization of the Public Service of South Australia and its Impact on Cadastral Administration.

In 1974 the South Australian Government appointed a Committee of Inquiry into the Public Service of the state. The committee presented its report in April 1975 [Committee of Enquiry into the Public Service of South Australia 1975].

The committee found that in 1974, South Australia had 46 administrative entities formally recognized as departments. Each, no matter how small, was responsible to a minister and each had a permanent head with the right of direct access to his minister. The "cadastral" departments in existence in 1974 were lands, registrar-general and valuation.

In the view of the committee it was necessary to reduce the number of departments. This was to be achieved by regrouping smaller departments to form larger organizations. The notion of regrouping into statutory corporations was ruled out.

Functionalist theory "heavily weighted by other more pragmatic considerations arising out of this State's history and its particular administrative needs" influenced the committee's recommendation on regrouping. This recommendation was that the number of departments in existence in 1974 should be reduced by at least 18.

From the point of view of cadastral administration the significant recommendations to the report were those relating to the Department of Lands, the Registrar-General's Department and the Valuation Department. A number of Department of Lands "land administration" functions were to be diverted to the Primary Industry Department (e.g., Primary Producers Assistance Committee and the Dog Fence Board). To the remaining
Table 2: ministries responsible for the South Australian Cadastre 1968–1977

<table>
<thead>
<tr>
<th>Year</th>
<th>Surveying and Mapping</th>
<th>Registration of Title</th>
<th>Valuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968</td>
<td>LANDS, Repatriation, Irrigation, Immigration</td>
<td>ATTORNEY-GENERAL, Social Welfare and Aboriginal Affairs</td>
<td>TREASURER, Housing</td>
</tr>
<tr>
<td>1969</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>1970</td>
<td>LANDS, Repatriation and Immigration</td>
<td>&quot;</td>
<td>TREASURER, Premier, Mines and Development</td>
</tr>
<tr>
<td>1971</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>1972</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>1973</td>
<td>LANDS, Chief Secretary, Repatriation, Irrigation</td>
<td>ATTORNEY-GENERAL and Community Welfare</td>
<td>&quot;</td>
</tr>
<tr>
<td>1974</td>
<td>&quot;</td>
<td>&quot;</td>
<td>TREASURER, Premier</td>
</tr>
<tr>
<td>1975</td>
<td>&quot;</td>
<td>ATTORNEY-GENERAL, Community Welfare, Prices and Consumer Affairs</td>
<td>&quot;</td>
</tr>
<tr>
<td>1976</td>
<td>LANDS, Irrigation, Repatriation, Recreation and Sport</td>
<td>ATTORNEY-GENERAL, Prices and Consumer Affairs</td>
<td>&quot;</td>
</tr>
<tr>
<td>1977</td>
<td>LANDS, Irrigation, Repatriation, Tourism and Recreation and Sport</td>
<td>LANDS, Irrigation, Repatriation, Tourism, Recreation and Sport</td>
<td>LANDS, Irrigation, Repatriation, Tourism, Recreation and Sport</td>
</tr>
</tbody>
</table>

(Source: South Australian Year Books 1976–1978.)

land administration functions (which included surveying and mapping carried out by the Survey Division) were to be added the Lands Titles Registration Office (the Registrar-General’s Department) and the Local Government Office of the Minister of Transport and Local Government Department. The result was to be the Department of Lands and Local Government. The committee considered that the Valuation Department should retain its separate identity as a department.

Following on the committee’s report, the government effected a reallocation of functions that was significant to cadastral administration in the state. A new Department of Lands was created on 29 April 1976, by amalgamation of the former Department of Lands, Registrar-General’s Department and Valuation Department. The government did not accept the Committee’s recommendation that valuation should remain a separate department. Instead the recommendation of the report of an LIS feasibility study group (consisting of specialist staff from the Public Service Board and the Department of Lands) was accepted and the valuation function was transferred to the newly created Valuer-General’s Division of the refurbished Department of Lands. Certain minor functions of the old department were transferred to other departments, but the major components, survey
and land resource management remained to become divisions of the new department, the structure of which is shown in Table 3.

Table 3: structure of the Department of Lands after Amalgamation in 1976.

<table>
<thead>
<tr>
<th>Division</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey Division</td>
<td>Provides a basic coordinated land survey framework for the specific identification and delineating of land parcels; produces maps required for resource management as part of a national program; provides ancillary surveying, drafting, aerial photography and mapping services.</td>
</tr>
<tr>
<td>Registrar-General’s Office</td>
<td>Administers a statutory system of official registration of interests in real property to ensure certainty of tenure to the owners of those interests; administers other statutory systems for the registration of interests in real and personal property.</td>
</tr>
<tr>
<td>Valuer-General’s Division</td>
<td>Provides valuation services for real property taxation purposes and other state government requirements.</td>
</tr>
<tr>
<td>Land Resource Management Division</td>
<td>Manages the crown’s interest in unalienated crown lands and any land in private occupation in which the Crown has reserved and residual interests; administers schemes of land settlement undertaken by the crown; develops and allots land as required to meet community demands.</td>
</tr>
</tbody>
</table>

(Source: South Australian Department of Lands 1977.)

The four Divisions are supported by a Management Services Division which provides personnel, staff development, organization and methods and other services.

The department is administered by a permanent head, the director of lands, who is responsible to the minister of lands.

The role of the department has been spelled out by the director of lands as:

To ensure that Government Land Policies are implemented, statutes administered and authorized services provided efficiently and effectively with a coordinated management structure supporting the director [South Australian Department of Lands 1985].

Government objectives for the department are:

- develop and maintain the state’s survey infrastructure, basic mapping program and the spatial reference system for the Land Information System, and the management of required surveying and mapping services for public and private land management purposes;
- provide the registration facilities and ancillary services required by statute through the effective and efficient administration of the Lands Titles Registration Office and the General Registry Office, in particular facilitating dealings in the title to land and securing indefeasibility of title to all registered proprietors;
- provide a comprehensive land valuation service for property taxation purposes and provide a valuation consultancy service for acquisition, disposal and other government purposes;
• conserve and manage unalienated crown lands and the crown’s interest in
alienated lands and the development and disposal into private ownership of
government owned land in accordance with government requirements.
The department’s internal objectives include a requirement for “... timely provision of
data to a standard necessary for the orderly correlation of land related information” [South
Australian Department of Lands 1985]. Toward the achievement of these objectives the
department administers the following Acts of Parliament:
• The Surveyors Act;
• The Real Property Act;
• The Valuation Act;
• The Crown Lands Act;
• The Pastoral Act18.
The first three of these measures are directly concerned with cadastral administration in
the State.

The growing importance of LIS in the South Australian context is clearly recognized in
the government objectives and internal objectives of the department. The first thrust into
this field began in 1974 with a major investigation into the coordination of developing and
existing land data systems into a fully integrated LIS. The first outcome of this study was
the development of the pioneering Land Ownership and Tenure System (LOTS) which
was initially implemented in 1979 by the Department of Lands. LOTS is a multipurpose
legal-fiscal data base, gathering information from a variety of sources, centralizing it in
one comprehensive recording system and making this information available on-line to
numerous enquiry locations. LOTS will eventually be combined with three other major
data bases viz. geographic, environmental and socioeconomic (Figure 3) to form the total
LIS for the state [South Australian Department of Lands 1986]. LOTS, of course,
remained in the Department of Lands and the success of the system was such that a Land
Information Unit has been established in the Department of Lands with the unit head
reporting directly to the director.

A CONCEPTUAL MODEL FOR CADAstral AND LAND
INFORMATION SYSTEM ADMINISTRATION IN SOUTH AUSTRALIA

The present strategy for the South Australian Land Information System is based on the
“nodal approach” as described by the Department of Lands:

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;
• socioeconomic.

This “nodal approach” (refer to Figure 3) is seen (in South Australia) as an effective
balance of the centralized/decentralized concept and the most practical and cost effective
method of achieving an integrated system [South Australian Department of Lands 1986].
NODAL APPROACH TO A LAND DATA BASE CONFIGURATION

(Source: South Australian Department of Lands 1986.)

Figure 3
The authors believe that the next major development of this approach should be as shown in Figure 4. This model could be termed a functional/administrative model for a state LIS. It concentrates on data relationships within an administrative structure. The model is hierarchical and recognizes the distinction between the parcel-based LIS and natural resource LIS and a further component designated as a cultural LIS.

The question that arises is whether or not the South Australian Government will accept that the cadastral and land information administrative environment that currently exists in the state should be brought into line with the model of Figure 4.

As shown in Table 2 above, prior to 1977, responsibility for the administration of the three main components of the cadastre was spread between three ministers. Ideally all three components should be included in the portfolio of a single minister who preferably should be qualified in one of the professional disciplines involved. Even if cabinet included such a professional in its ranks there is no certainty that he would be allocated the “cadastral portfolio”. This is due partly to the fact that there are no hard and fast criteria for the selection of ministers. If anything, they largely choose themselves [Davies 1964]. Again, the question of seniority of portfolios is involved. Notwithstanding these factors, it is considered that it was advantageous to the administration of the cadastral and land information in South Australia in that, since 1977, surveying, registration of title and valuation have been located within the Department of Lands and consequently fall within the responsibilities of the minister of lands.

Some thought has also been devoted in Australia to the question of the status and location of the administration of land information and cadastral systems. Zwart identified a need (in connection with the creation of an LIS) for a fundamental reassessment of the role of information and the bureaucracy which uses it [Zwart 1981]. Hart advocates “... that to be successful a LIS needs to have a fairly significant status regardless of the case used to justify the system...”. In discussing administrative location and structure he postulates three alternatives for locating the development and management of an LIS within a state government. These are: (1) within a lands department; (2) within a central coordinating location, or; (3) somewhere else. Hart points out certain disadvantages associated with the first of these options including the possibility of inadequate status of a lands department in the political hierarchy. In the New South Wales situation he considers the location of the LIS in the Department of Lands as advantageous as that department has responsibility for “... what are the two chief pivots of a land information system — the graphic (or mapping) function and the property registration function (land titling)” [Hart 1985]. Hart’s approach is consistent with the notion of grouping of functions according to purpose [Parker 1975].

In the South Australian Department of Lands, the main cadastral functions are currently exercised by the Surveyor-General’s, Registrar-General’s and Valuer-General’s Division with each divisional head reporting to the department head, the director of lands (see Figure 5).

In addition a Land Information Unit has been created. The head of the Land Information Unit holds a staff position reporting to the director of lands as shown in Figure 5. The involvement of the number of departments in land information management in the advisory sense is reflected in Figure 6 [AURISA 1985].
From the point of view of cadastral administration (bearing in mind that the cadastre can be regarded as the cornerstone of the wider LIS) it would appear that the existing structure of the Department of Lands, notwithstanding the arrangements portrayed in Figure 5, approaches the ideal. The same cannot be said of the administration of the land information system per se.

CONCLUSION

The conceptual model of LIS proposed in Figure 4 (as well as the model showing nodes in Figure 3) embraces a number of data bases, all of which fall outside the administrative control of the Department of Lands. From the point of view of LIS administration, these functions could be incorporated in that department although this is considered neither necessary nor practical in the South Australian context. In any case LIS administration is concerned with the management of data flows that in themselves should be apolitical. Because of this aspect and the magnitude of the administrative task, the authors recommend that, notwithstanding the views of the South Australian Committee of Enquiry with
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Don M. Grant, prior to taking up his appointment in early 1986 as surveyor-general and deputy director of mapping for New South Wales, he held the post of deputy surveyor-general, Department of Lands, South Australia. He has recently been awarded the degree of Master of Environmental Studies by the University of Adelaide. A member of the Institution of Surveyors, Australia and a Fellow of the Royal Institution of Chartered Surveyors (London). Don is a licensed surveyor in Victoria and South Australia and a licensed land broker in the latter state. He has enjoyed over 17 years of professional experience in cadastral and engineering surveying and during the period 1965 to 1980 he was chief surveyor and corporate planner to the city of Adelaide. Don has served in the Australian Army and in the Reserve Forces rising to the rank of Lt. Colonel.

Ian P. Williamson, gained a Bachelor of Surveying in 1970, a Master of Surveying Science in 1974 and a Doctor of Philosophy in 1983, from the School of Surveying, University of New South Wales. He became registered as a surveyor in N.S.W. in 1971 and received the Barr Prize from the Institution of Surveyors, Australia, N.S.W. Division, for his performance in the registration examinations. Before joining the staff of the School of Surveying, University of New South Wales in 1976, he worked for the N.S.W. Department of Main Roads and a multidisciplinary American corporation working throughout the Pacific region, as well as being a partner in a consulting surveying practice based in Sydney. As a senior lecturer at the School of Surveying he specializes in cadastral studies, land information management, and land management problems in developing countries. In this regard he has consulted for the Australian government and the World Bank and has been an adviser in Fiji, Thailand, Malaysia and Brazil. In 1980 he spent six months as a visiting scholar at the University of Cambridge, U.K. and in 1984, six months as a visiting professor at the University of New Brunswick, Canada. He recently spent one year on exchange with the Australian Survey Office in Canberra. In mid-1986 he became a Professor Surveying at the University of Melbourne. Professor Williamson has been a member of the Institution of Surveyors, Australia since 1970.