

**“COMPUTERISED LAND INFORMATION FOR SURVEYORS;  
YESTERDAY’S DREAM, TODAY’S REALITY”**

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**Introduction**

For many years, surveyors have been at the forefront of initiatives to develop national land information systems. The ambitious plans of the 1980s have resulted in many papers and seminars on the topic, some ambitious plans but only slow progress in implementing those plans. In this paper, recent initiatives in New Zealand and Fiji will be reviewed to illustrate how two different approaches have significantly improved access to computerised land information in both countries.

In Fiji a well supported government departmental programme has introduced a personal computer based national land information system (LIS). In New Zealand, the impetus for an improved land information infrastructure has been the restructure of the Department of Survey and Land Information into two organisations. A new department has been created with a clear agenda for an automation programme to develop an efficient infrastructure integrating survey and title process. Secondly a new commercial organisation has been established (Terralink NZ Limited) to pursue value added land information and other commercial opportunities.

**New Zealand Land Information System Initiatives**

The New Zealand Government’s Land Information System (LIS) began in the mid 1980s with various policy initiatives to provide an inter-departmental framework and was followed by the Auckland LIS pilot study which ran through to 1996. The

Auckland study was an ambitious pilot study in that it included 500,000 parcels and title, cadastral mapping, survey, valuation, Maori Land Court and public land records sourced from four government departments.

A large amount of effort in this pilot study was involved in designing and developing applications for the conversion of manuscript records as well as applications to keep the data up to date and support departmental processes. These new applications and data conversion projects often went beyond the Auckland land district and covered all New Zealand. For instance New Zealand has a national Digital Cadastral Database (DCDB), a Land Titles Index and an Automated Plan Register and Enquiry System (APRES).

The other area requiring effort was to match the corresponding records from the different departmental databases so that the parcel of land portrayed on the cadastral map was related to the correct title portraying ownership and rights in that land, the correct survey plan defining the boundaries, the valuation record detailing the values and the improvements found on the property and, where appropriate, the Maori Land Court record of the rights of New Zealand's indigenous people or a record of some statutory action affecting that land.

Although a large percentage of records can be matched by a computerised comparison, the remaining un-matched records is where the major effort was required to resolve the discrepancies accumulated over 150 years of paper based cadastral records.

The report on the Auckland LIS pilot with the recommendation to proceed with a nationwide implementation was considered by the New Zealand Cabinet in 1995. While recognising that there would be considerable benefits from a nationwide LIS, Cabinet decided against funding any further LIS development on the grounds that those benefits were primarily "private good" and hence it was not appropriate to commit government funding.

## **Restructuring of New Zealand Department of Survey & Land Information**

At the time the LIS Cabinet decision was made, the New Zealand Cabinet was also considering a report on the future structure of the Department of Survey and Land Information (DoSLI). DoSLI came into existence in 1987 when the original Department of Lands & Survey was restructured in the first wave of departmental restructuring of the fourth Labour Government.

DoSLI had acquired the Land Titles Office in late 1994 when the Department of Justice had been split up and one of objectives of the 1995 Cabinet decision restructuring DoSLI was to integrate departmental survey and title processes and the databases associated with those processes. The other objective of Cabinet was to separate out the commercial surveying, mapping, GIS, land information distribution and public land property work and place those activities in a separate company structured organisation more appropriate for commercial activities.

For these reasons, Cabinet decided to create two new organisations. A department, Land Information New Zealand (LINZ), which was given the responsibility of policy advice to Government, managing survey and mapping contracts, data custodianship of core databases and the implementation of an automation programme to integrate survey and title operations.

The other organisation, Terralink (NZ) Limited is a company owned by the New Zealand Government, with a board of directors and a structure like a private company. Terralink assumed all the commercial functions previously undertaken in DoSLI. Both LINZ and Terralink came into existence on 1 July 1996 staffed predominantly by staff from DoSLI.

## **Fiji Land Information System Initiatives**

There has been a long standing relationship between the Fiji and New Zealand departments which has included assistance to mapping and surveying initiatives through the New Zealand Overseas Development Assistance programme. In 1990 the

Fijians, having followed international LIS initiatives, decided they would like to investigate how they too could take advantage of this type of development. The Fiji Government requested assistance from New Zealand to make an assessment of the benefits to Fiji and to prepare a strategy for LIS implementation in Fiji.

The Fiji LIS strategy (Department of Survey & Land Information, 1990; Fiji Land Information System Support Centre, 1993) reviewed existing land record systems where most of these systems were still in hardcopy manuscript form. Thirteen systems located in seven different agencies were identified as the systems requiring early attention in the first stage of implementation as well as putting in place an infrastructure which would permit the on-going and sustainable development and operation of a Fiji Land Information System (FLIS) with a reducing dependence on outside assistance from countries such as New Zealand. Policy formulation covering issues such as data fees and charging, land information standard preparation and training were also important components to the FLIS strategy. The FLIS strategy was approved by the Fiji Cabinet and implementation began in October 1990.

In the first two years, all thirteen of those initial systems were implemented within FLIS and the FLIS strategy has been revised to include a second stage of implementation involving the creation of a topographical database. Within the Fiji, FLIS is seen as a very successful initiative and a model to other departments as to how computerisation can occur, even when it involves several departments.

Contributing factors to the success of FLIS have been:

- the active role taken by the Permanent Secretary for Lands, Ratu Mosese Volavola, in securing support for the initiative both amongst other permanent secretaries and at the political level (his predecessor has also been a strong champion of FLIS)
- the support of the New Zealand Overseas Development Assistance programme

- the enthusiasm and high calibre of the staff involved in the implementation and operation of FLIS coupled with a strong emphasis on training

Although the emphasis of the first stage of FLIS was to streamline the cadastral and title processes, many other benefits have resulted (Pullar, 1994). Only very limited on-line access is available outside of the FLIS wide area network, but there is considerably better public counter service now available utilising FLIS terminals. A major benefit to surveyors and lawyers is that processing times for title transactions have dramatically reduced.

### **Terralink's Value added Products**

In July 1996 when the two new organisations were established, the on-going responsibility for the New Zealand Overseas Development Assistance "Continuing Links" and the Fiji topographical data conversion projects was allocated to Terralink.

Other assets or previous services undertaken by DoSLI that were allocated to Terralink were:

- the **Survey Data Inquiry (SDI) public counter enquiry software**. SDI had been implemented in all DoSLI offices during 1995 to replace the sets of cadastral record map sheets, which had been held in each of the 12 provincial centres.
- the **Auckland LIS pilot database** and all the associated application software.
- the **change of ownership service** to some local councils.
- the **mortgage summary reporting service** to a trading bank.

These assets and services formed the basis for a family of "Terra" products which has evolved as Terralink has gained a better appreciation of market needs and new technology has been harnessed to meet those needs.

<b>Terra Product</b>	<b>Description</b>
Terraview	A GIS Data Viewer originally based on DoSLI SDI software including the New Zealand DCDB as well as other cadastral details. Terraview comes with a regular data update service and has been customised to include other data themes
Terranet	Land information internet service providing on-line access to title, valuation, survey and public land details for any land parcel. In addition you can order copies of titles, documents and survey plans
Terramatch	An adaptation to the Auckland LIS Central Index which has been extended nationwide. Clients (typically councils) are supplied with a table providing a series of identifiers (title reference, owner name, DCDB id, valuation reference etc) for each parcel. A data update service is incorporated in this service.
Terrabank	A service provided to lending institutions to enable clients to monitor mortgage market share movements.
Terracode	A service to geocode client's address based data through matching to the Terramatch database
Land schedules	Using the Terramatch database, Terralink can provide schedules of land – typically land in a particular ownership (like the identification of government land for Treaty of Waitangi claims) but also land affected by a certain statutory action or the cadastral and ownership details of polygons of land identified by means such as remote sensing (e.g. schedule of all owners of exotic forest lands)

Each of these products has their own story as to how they have been developed and marketed and it is not possible in this paper to describe the background to every Terra product. Instead only Terraview, the product which has gained widespread acceptance with New Zealand surveyors, will be described.

The original SDI software was developed for use on a file server. Terralink's first software development was to modify it to be distributed and, as another implementation offer, to run directly from the CD. The other challenge to Terralink in

its first few months of existence was the market release of Terralink. How should Terralink be priced, packaged and promoted?

Market research focussed on surveyors was used to provide some answers to those questions. The concept of a "Terra" family of products was established and a "Terra" "look and feel" designed and incorporated into the Terraview packaging and promotional material. The occasion for the launch was the 1996 NZ Institute of Surveyors conference held in Rotorua in October. Terraview proved to be extremely topical to this conference, as there was considerable interest in the impact of Terralink on the New Zealand survey industry.

Initially, Terraview came with two data options; one that was limited to DCDB data and another "Property" view including the data sourced from the Auckland LIS such as title and valuation references. This "Property" view was extended to the whole country by April 1997 with the completion of a national cadastral matching project.

Over the 18 months since the market launch of Terraview there have been four versions of the software and sales for over 300 single user licences made. Terraview is now being marketed to all land related professionals as well as government departments, local councils, power utilities and Maori iwi groups. The first international sale of Terraview has just been confirmed in Fiji where it will be known as Vanuaview and the release of Terraview in various Australian states is being investigated.

### **Evolving needs of surveyors**

In a product like Terraview, the evolving needs of surveyors for computerised land information have been very apparent. Initially, the challenge to Terralink in marketing Terraview was to convince surveyors that data searches could occur at the time of an initial client enquiry and in their own office using Terraview without any need to visit the local LINZ office. Now surveyors who have Terraview do not need to be convinced. They have mastered the art of using Terraview with one hand while

holding a phone with another hand, whilst providing clients with an immediate estimate at the time of that first phone enquiry.

Other uses of Terraview soon came to light as enterprising surveyors saw possibilities and changed the way they performed survey tasks. A few examples of these new Terraview survey applications are:

- Early Terraview users prepared subdivisional scheme plans using hardcopy Terraview printouts with proposed subdivision boundaries added by hand draughting. A suggestion was made that Terraview incorporate a DXF export function so that the DCDB existing boundary boundaries could be exported from Terraview directly into surveyor's CAD package and the scheme plan produced completely by computer.
- Another early suggestion was for the addition of survey control marks (trig stations and benchmarks) as a level in Terraview with each mark annotated with coordinate and height values.
- In a number of smaller centres remote from provincial centres where there are no LINZ offices, surveyors with Terraview have provided a simple land information service to other land related professionals such as valuers and real estate agents.
- Some surveyors have started to record each of their own survey jobs along with the job number or survey file reference on the Terraview user level so that they can quickly find old survey file material without having to rely so much on their memories
- Surveyors using GPS to capture the coordinates of features such as bridges, agricultural features, tracks and roadlines are loading this GPS data into Terraview (via a simple DXF file) to provide simple verification plots

- Surveyors using simple GIS (like MapInfo or ArcView) can run Terraview as a simple backdrop to the GIS thus negating the need to load DCDB into the GIS for simple mapping and GIS work

### **New Generation surveyors – what will they need?**

If the Terralink experience with the Terra products and services is anything to go by, as land information is made more available the expectations of users such as surveyors will rise comparably. In the last year, Terralink has found that Terraview users are getting more and more demanding. The fact that at the same time last year some surveyors would have needed to travel several hours to obtain access to the same information they now have in their own office through Terraview, does not stop them from making very strong suggestions as to what enhancement should be in the next release of Terraview.

Even more intense has been the experience with Terranet. Never has so much land information been made available in New Zealand in one system nor has a system been so accessible, thanks to the internet. However, Terralink has found that users have forgotten the difficulties in dealing with the existing discrepancies in cadastral and titles data and the effort they have previously had to go through to resolve those discrepancies, prior to Terranet. Instead users have shown themselves to be very demanding in the quality of the data and the way the data is represented.

Terralink is not yet able to provide on-line access to survey plans and title documents. Terranet enables you to order those documents but users are already asking for immediate on-line access.

In New Zealand the expectations of surveyors for land information has been further raised by the user consultation undertaken in the initial stage of the LINZ Automation programme. Although the LINZ Automation programme will not begin to deliver benefits for at least another year, and many benefits not for another five years, the following concepts have been introduced to the surveyor user community:

- on-line digital lodgement of survey and title transactions,
- on-line access to a comprehensive range of land information,
- dramatically reduced departmental processing times,
- survey accurate DCDB (and the associated functionality of a numeric cadastre)
- a dynamic geodetic datum with on-line access to coordinate values of control points

These concepts have caught the imagination of surveyors in New Zealand and they are impatient to experience the reality.

The Papua New Guinea land information situation is undoubtedly different from New Zealand, however there are also similarities:

- surveying methods in both countries are dependent on computers which are a significant capital cost to survey businesses
- access to cadastral and survey information needs to be improved
- discrepancies in existing records making up the authoritative government records and the resolution of those discrepancies are costly both to the individual surveyor, to the surveyor's client and to the country as a whole

Whereas in the past surveyors have made do or worked around these constraints, the new generation of surveyors in both countries is not going to be as patient as previous generations. The new generation of surveyor is better educated and is less inclined to accept the status quo. They will initiate and demand of government ways to overcome these constraints, inevitably utilising appropriate forms of the latest technology. These initiatives no longer need to cost large amounts as has been shown in Fiji.

The key to implementing these changes is to have a vision, a grand plan, for the ideal environment. A plan then needs to be devised which implements that vision but the plan must allow for the early, modest achievements which deliver benefits across the user community so as to enlist and maintain support for the vision. The new generation of surveyors should be encouraged to be the advocates for this vision as they will be the ones who will benefit when it becomes a reality.

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