

Cadastre 2014 - Australia and New Zealand; now and the future

Bill HIRST, Australia

Key words: Cadastre 2014, Cadastre 2030, vision statements, Australia and New Zealand

SUMMARY:

FIG's vision for the future cadastral system was outlined in July 1998 by Jürg Kaufmann and Daniel Steudler as 'Cadastre 2014'.

This paper looks at how Australia and New Zealand are meeting the challenges established by this vision. The paper identifies obstacles encountered and looks at the future relevance of the six statements.

The paper concludes by identifying some of the new challenges facing cadastral reform as a fundamental component of good land governance for the next twenty years. It recommends consideration be given to the development of a new cadastral vision for 2030.

Cadastre 2014 - Australia and New Zealand; now and the future

Bill HIRST, Australia

1. INTRODUCTION

In 1998 a specially commissioned FIG working group submitted a booklet entitled “Cadastre 2014 – A Vision for a Future Cadastral System” (Kaufmann and Steudler, 1998). The document, widely known as Cadastre 2014, contained six vision statements.

Steudler (2006) explains that although Cadastre 2014 has attracted wide international attention, it has sometimes been misinterpreted and misunderstood. It is also clear that the relevance of the vision statements varies amongst different countries administrative, legal and political situations (Van Der Molen, 2003).

Nevertheless, the wide use of Cadastre 2014 demonstrates a strong international desire for guidance and direction in cadastral development. Examining the relevance of this document after the eleven years since its publication may suggest how well trends can be predicted.

This paper therefore looks at how relevant the six statements are now in the context of Australia and New Zealand. While an attempt is made to identify future trends, these are again in the Australian and New Zealand context. It is recognised that far more work will be required to develop a new cadastral vision for the next twenty years, particularly for an international framework.

2. AUSTRALIAN / NEW ZEALAND CONTEXT

Australia and New Zealand have very similar historical, administrative, economic, political and social histories. Both originally being British colonies, they have inherited much of the English legal system and common law. Early assumptions of ‘terra nullius’ ignored indigenous occupation in Australia and land administration was therefore based upon a clean slate approach. In New Zealand Māori were accepted as legitimate occupiers of the land with whom settlement needed to be negotiated.

Both countries have sound economies and stable governments.

The Torrens Title system of guaranteed title was introduced throughout Australia in the eighteen fifties and sixties and a short time later in New Zealand. While not perfect, the land administration systems in the two countries have developed a high level of integrity, boundaries are generally very accurately determined, and disputes are rare and usually easily resolved.

Australia's six states and two territories have individual laws and administrative systems however they are fundamentally the same. New Zealand was the first to introduce electronic survey plan lodgement however Australia is rapidly introducing a similar system.

3. CADASTRE 2014 VISION STATEMENTS:

Statement 1 – Cadastre 2014 will show the complete legal situation of land, including public rights and restrictions.

Cadastre shows a full listing of all rights, restrictions and responsibilities over land. As land becomes more scarce and valuable, more public rights and restriction will influence private land requiring a cadastral system capable of recording all such legal interests. (Steudler 2006) Examples may be environmental protection, noise protection, construction laws.

Statement 2 – The separation between maps and registers will be abolished.

Computerisation and integration of past system of separate maps and registers.

Statement 3 – Cadastral mapping will be dead, long live modelling.

Cartographers will be gone. This is not only computerised drafting but use of technology and data modelling to facilitate data analysis, statistics, reports etc as well as digital and hard copy maps at various scales. E lodgement is an extension of this concept.

Statement 4 – Paper and pencil cadastre will have gone.

Hard copy registers will be replaced by data models combining the location with the land registry attributes. The seamless linking of spatial and attribute data.

Statement 5 – Cadastre 2014 will be highly privatised. Public and private sector are working closely together.

The statement acknowledges that the private sector provides consumer oriented, flexible and innovative services. Public involvement is required to ensure integrity of the system is maintained.

Statement 6 – Cadastre 2014 will be cost recovering.

System should be capable of identifying real costs and benefits as well as taxes and fees.

4. PROGRESS AND FUTURE – AUSTRALIA AND NEW ZEALAND

4.1. Statement 1 – Cadastre 2014 will show the complete legal situation of land, including public rights and restrictions

4.1.1 Progress

The linking of digital plans and registers has partially addressed this issue. Also, Australia and New Zealand have made considerable progress generating Digital Cadastral Databases (DCDB). The positional accuracy of these DCDBs varies however they nevertheless facilitate cadastral overlays to visualise overlapping rights and restrictions where such information is available.

Australia and New Zealand each have a consistent, geocentric national geodetic datum ensuring all spatial data is capable of being referenced to a consistent framework, to facilitate integration. Web mapping facilities are now widespread and these offer significant opportunities to integrate a wide variety of relevant information. Such technology is likely to become increasingly important as users become more familiar and increased internet bandwidth improves performance and capability.

These initiatives only partially address the vision expressed in this statement. The idea that all rights, obligations and restrictions relevant to any parcel of land can be obtained via a single inquiry remains a challenge.

As Steudler (2006) and Williamson et al (2007) predict, there appears to be ever increasing public interests over private land. For example, climate change has been attributed to the increasing number and severity of bushfires (Sydney Morning Herald, 9 February 2009). Properties bordering high risk fire danger areas are now subject to additional building codes and safety requirements. While such information is readily available, it is generally not directly linked to individual parcels. Other examples include implications of sea level rise, storm surges, solar aspect for energy efficiency, natural resource rights and obligations, and adequately managing some more complex native title. World wide food shortages contrast with restrictions on land clearing, water use, chemical use etc.

The Australian / New Zealand systems continue to be parcel based. Kalantari et al (2006) suggests that such systems are not able to accommodate the growing number of interests in land. Community title is becoming increasingly common. These titles are where an area of land is divided into individual lots plus a common property area, usually parks and roads, administered and maintained by the lot owners. Some jurisdictions provide for Unit Titles (Strata) within a Community title. Therefore unit owners have varied rights, obligations and restrictions within the unit complex and within the greater community title. The current parcel based system struggles to model such complex interests.

Also many rights, obligations and restrictions are not defined in a way that they can be spatially described to a sufficient degree of precision to determine the relationship to the underlying parcels. For example, an administrative zone is defined for coastal protection, extending 100m inland from the line of high tide – if we do not have precise information about the location of the line of high tide, then we cannot provide a precise spatial representation of the administrative zone.

4.1.2 Future relevance.

This vision is clearly still very relevant; in fact the relevance of this vision appears to be increasing. Technology has provided a number of solutions, or at least partial solutions. Coordination, standards and skills are required to capitalise on such technology. The quality, including the positional accuracy, of much of our existing data can also be a limiting factor.

4.2. Statement 2 – The separation between maps and registers will be abolished

4.2.1 Progress

TS 8K – Developing Cadastre from Cadastre 2014

4/9

Bill Hirst

Cadastre 2014, Australia and New Zealand, now and the future

FIG Congress 2010

Facing the Challenges – Building the Capacity

Sydney, Australia, 11-16 April 2010

Traditionally cadastral mapping has been separate from title registries. In some jurisdictions they were, and still are, managed by different organisation. To meet this vision it is not necessary to have a complete integration of the separate organisations (Steudler 2006).

In Australia and New Zealand it is now usually possible to access both the cadastral ‘maps’ and the title registry information together regardless of where they are maintained or stored. Restrictions on access are applied for privacy reasons however essential information is generally readily available. The cadastral database is usually stored separately with links to the register although in New Zealand they are stored in the same database.

General public access to links between cadastral data and registries is usually limited to very basic information. This protects privacy and also allows for cost recovery of some information. However in NZ almost all the titles data is included in the bulk data extract which is very data rich and available at the cost of supply. This includes the names of the registered proprietors.

However this system is commonly based upon the land parcel as the basic cadastral unit. As Kalantari et al (2006) points out, the person to parcel relationship has inherent limitations. Three dimensional cadastres are becoming increasingly common however our current cadastral models handle these poorly at best. Links to property ownership registers are only part of the story. Better systems are required to link to the wide variety of rights, obligations and restrictions.

4.2.2 Future Relevance

Beyond the linking of the cadastral parcels with registry of titles, Australia and New Zealand are limited in the relationships between the cadastral map and the ever increasing range of legal registers. Further work to improve the potential to link a wider variety of interests in land to the cadastre is required.

4.3 Statement 3 – Cadastral mapping will be dead, long live modelling

4.3.1 Progress

Australia and New Zealand have a Harmonised Data Model (HDM) which incorporates cadastral data with topographic data. This HDM is primarily designed to facilitate data transfer rather than to enforce a common data structure. It may assist as a benchmark standard to help cadastral models converge over time.

Recent cooperation between the HDM working group and the European INSPIRE project are endeavouring to ensure the HDM is compatible with international models.

Australia is following New Zealand’s lead in implementation of electronic survey plan lodgement. These initiatives offer efficiencies in survey lodgement, validation and improvement to DCDB accuracy and integrity. The need for lodging hard copy cadastral survey plans is rapidly decreasing.

The HDM however lacks the flexibility to fully model all rights, obligations and restrictions (Kalantari et al., 2006). The model was designed for flexibility however this characteristic has not been tested or evaluated. The HDM needs to expand to more adequately incorporate three dimensions.

4.3.2 Future Relevance

While Australia and New Zealand are moving towards more consistent cadastral data models incorporating electronic plan lodgement, more work needs to be done to incorporate three dimensions and consider how to incorporate a wider range of rights obligations and restrictions, including three dimensions.

4.4 Statement 4 – Paper and pencil cadastre will have gone

4.4.1 Progress

Hand drawn survey plan preparation has now almost totally disappeared within Australia and New Zealand. Electronic plan lodgement is now being implemented in most jurisdictions however signed hard copy plans are still produced as final versions in many jurisdictions. Digital cadastral databases link essential attributes to cadastral models.

4.4.2 Future Relevance

As a vision, this statement has been largely incorporated into vision statement 3. Indeed the two have been considered together in some instances (Van De Molen 2003).

4.5 Statement 5 – Cadastre 2014 will be highly privatised. Public and private sector are working closely together

4.5.1 Progress

Australia and New Zealand have mutually recognised systems of registering or licensing private surveyors found competent to conduct cadastral surveys. This system of registration / licensing provides private sector efficiencies with public control of quality control and standards. Surveyors understand that they have obligations to both the client and the crown. This balance of private and public has worked well for many years.

There is some scope for greater industry participation in the governance of the cadastral system – e.g. industry-based standards; co-regulation; etc. – but the small size of the industry has mitigated against this.

4.5.2 Future relevance

This vision statement is not relevant to Australia and New Zealand for the future as the current balance between private and public is stable and rarely contested.

4.6 Statement 6 – Cadastre 2014 will be cost recovering

4.6.1 Progress

Within Australia and New Zealand cadastral subdivision is paid for by clients employing private surveyors. The major cost to government is the maintenance and development of the cadastral system although this cost is recovered via plan lodgement fees in some jurisdictions. Cadastral data is sold by most jurisdictions however the price is designed to cover the cost of the distribution of the data, not the full recovery of cost of capture, maintenance and infrastructure.

Sales tax on real estate transactions is a major revenue source for the Australian governments. The cost of maintenance and development of the cadastral system required to underpin this revenue source is comparatively small. Nevertheless the importance of the maintenance and enhancement of the cadastre needs to be recognised, regardless of the funding source.

4.6.2 Future Relevance

Experience in New Zealand has shown that full cost recovery is attainable and a worthwhile goal. Where full cost recovery is less evident, continuing to articulate the importance of the entire cadastral system both as the core element of land administration and as a fundamental information infrastructure remains an ongoing challenge.

5. **OTHER CADASTRAL CHALLENGES**

All Australian and New Zealand jurisdictions are continuously improving the positional accuracy and the integrity of their digital cadastral databases. This trend leads to the on-going debate on where coordinates sit in the chain of evidence to define boundaries. Rapidly improving absolute positioning will continue to add pressure to define boundaries via coordinates. The legal implications of these issues need further consideration and debate.

6. **CONCLUSION**

The wide international use and continued reference to Cadastre 2014 highlights the need and importance for FIG to provide agreed guidance on future directions for cadastral development. The implementation of many of the original six vision statements for Australia and New Zealand confirms their relevance. Papers such as those by Steudler (2006) and Van Der Molen (2003) provide important lessons for future work including a more international perspective.

This paper recommends that FIG consider producing a new vision statement, Cadastre 2030. While such a statement would inevitably be a projection of current trends, it should also attempt to establish best practice as attainable goals.

Such a document would need to be truly international, and could incorporate some of the ideas raised above. In particular, from an Australia and New Zealand perspective, the future directions should include:

1. Statement 1 *Cadastre 2030 will show the complete legal situation of land, including public rights and restrictions* continues to be relevant. Such a cadastre should show all interests in land. This will include more complex tenure arrangements to accommodate international situations and be flexible enough to incorporate changing

needs. Aspects of Statement 2 related to registries could be included to link registries other than land titles.

2. Statements 3 and 4 have continued relevance to incorporate 3D models and add flexibility to broaden applications. Considerations such as those raised by Kalantari et al. (2006) should be considered.
3. Consideration should be given to the implications of legal coordinates to define, or play a greater role in defining, cadastral boundaries. It is recognised that this may be a staged progression as positional accuracy improves.

REFERENCES:

- Bevin, Tony, 1999 'Cadastre 2014 Reforms in New Zealand', FIG Commission VII Conference and AGM, Bay of Islands, New Zealand.
- Kaufmann, J. and Steudler, D 1998, Cadastre 2014 – A Vision for a Future Cadastral System', Switzerland, Working Group 1, Commission 7, International Federation of Surveyors.
- Kalantari, M., Rajabifard, A., Wallace, J., Williamson, I. 2006, 'A New Vision on Cadastral Data Model', XXIII FIG Congress, Munich, Germany
- Steudler, Daniel, 2006, 'Cadastre 2014 – Still a Vision' XXIII FIG Congress, Munich, Germany
- Van Der Molen, Paul, 2003, 'the Future Cadastres – Cadastres after 2014' FIG Working Week, Paris France
- Wallace, J. and Williamson, I. P. (2005) , 'The future role of the cadastre', in Proceedings, of CIES Korea 2005 – Cadastral Innovation Expo and Seminar, Seoul, Korea

BIOGRAPHICAL NOTES

Bill Hirst is the Chief Surveyor for the Australian Capital Territory.

Qualifications:

Bachelor of Surveying, Uni of New South Wales in 1975
Registered as a surveyor 1976.
Masters of Surveying Science from Uni of NSW in 1992
Graduate diploma in Management from Uni of Western Sydney 1996

Work History:

Variety of Surveying and GIS tasks with NSW RTA for 20 years.
Manager of maritime boundaries project with Geoscience Australia 1997 - 2007.
Chief Surveyor of the Australian Capital Territory from 2007 to present.

CONTACTS

Mr Bill Hirst
ACT Planning and Land Authority
16 Challis Street, Dickson
ACT
AUSTRALIA
Tel. +61 2 6207 1965
Fax + 61 2 6207 1615
Email: bill.hirst@act.gov.au
Web site: http://www.actpla.act.gov.au/tools_resources/maps_land_survey

TS 8K – Developing Cadastre from Cadastre 2014

9/9

Bill Hirst

Cadastre 2014, Australia and New Zealand, now and the future

FIG Congress 2010

Facing the Challenges – Building the Capacity
Sydney, Australia, 11-16 April 2010