

# Australian Cadastral Strategy – Consultation Draft

**Bill HIRST, Australia**

**Key words:** Cadastre, Strategy, Land Administration

## SUMMARY

The land boundary system of Australia underpins a stable and reliable land-based property rights system that makes a significant contributing role towards economic and social prosperity.

The draft Cadastre 2034 strategy developed by the Intergovernmental Committee on Surveying and Mapping (ICSM) recognises that this function will continue to be an important part of our future (ICSM, 2014). It also anticipates societal demands will change substantially over the next 20 years as new technologies, environmental challenges and social and political influences, which are increasingly dependent on real-time mobile knowledge, gradually transform inherent traditions, practices and thinking.

Cadastre 2034 establishes a single philosophy for Australia detailing what the community can expect and what the government has to deliver in the future. Cadastre 2034 will guide the evolution of jurisdictional systems and ensure a coordinated and consistent approach to future policies, legislation, standards, models and research; and provide clear direction for the sector as a whole.

The strategy has five goals. These are directed to achieving a cadastre that is:

- fundamental to land and property ownership and is sustainably managed;
- multipurpose, truly accessible, easily visualised, and readily understood and used;
- fully integrated with broader legal and social interests on land;
- a representation of the real world, which is survey accurate, 3-dimensional and dynamic; and
- a national cadastre based on common standards.

This international launch of the Australian cadastral strategy is a consultation draft. We welcome input and feedback from the international community.

# Australian Cadastral Strategy – Consultation Draft

Bill HIRST, Australia

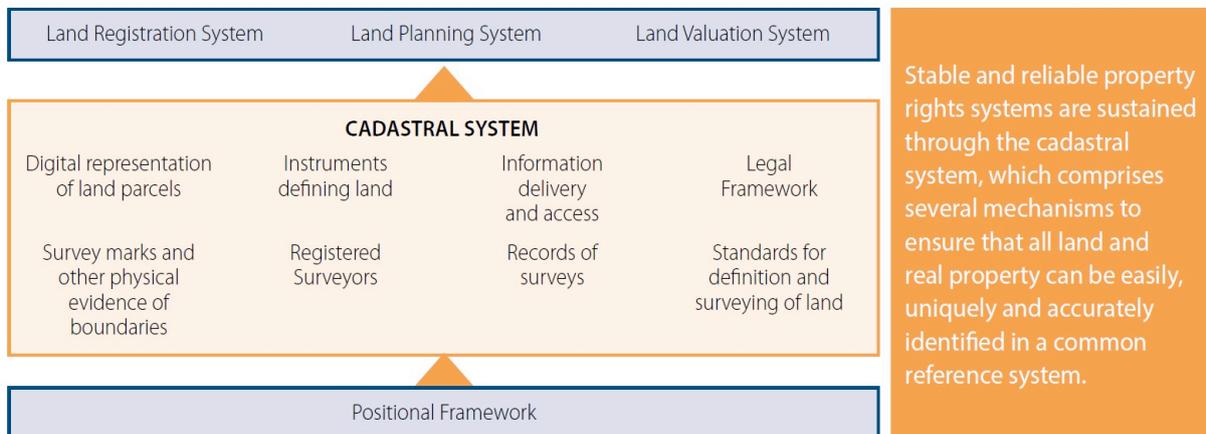
## 1. INTRODUCTION

The Intergovernmental Committee on Surveying and Mapping (ICSM) comprises senior surveying and spatial government representatives from New Zealand and all Australian states and territories. The Permanent Committee on Cadastre (PCC), a subcommittee of ICSM, has prepared a 20 year draft strategic vision for the Australian cadastre.

For the purpose of this strategy the cadastral system defines and records the location and extent of property rights, restrictions and responsibilities. It includes a geometric description of land and real property boundaries linked to other records describing the nature of the interests, the ownership or control of those interests, and often the value of the parcel and its improvements (FIG 1995, ICSM 2009)

At the time of writing the ‘consultation draft’ version of the strategy has been agreed upon. This version will be widely circulated to encourage comment and suggestions to ensure the final version truly represents the views of those impacted.

This paper also respectfully suggests that FIG should consider developing a new 20 year vision for the international cadastre building on the recently published New Zealand Cadastre 2034 as well as the Australian draft strategy.



## **IMAGINING 2034 AND THE CASE FOR CHANGE**

### **1.1 Economic Sustainability**

The cadastre, in combination with the land registration system, is a powerful economic lever. It assembles, manages and shares information that defines and reinforces property rights. In turn, these property rights translate into economic development, social stability and physical wellbeing.

In 2013, \$1.3 trillion of mortgages were secured against land titles (Australian Bureau of Statistics 2013 -1). At the same time the total value of all real property held in title in Australia was estimated as \$4.7 trillion (Australian Bureau of Statistics 2013 -2). Given that the size of the Australian economy is \$1.5 trillion per annum (as at November 2013) (Australian Bureau of Statistics 2013 – 3); the value of a sustainable cadastral system is self evident.

The cadastral survey and land registration systems allow people, businesses and governments to leverage and manage this huge national asset base of \$4.7 trillion.

### **1.2 Technological Innovation**

The trend for computers to become smaller, faster and more powerful will continue in line with community expectations. The cadastral system needs to anticipate economic innovations in new areas capitalising on demands for easier and quicker access to more details related to property information. This technology should provide improved supply chains to facilitate faster survey lodgement and easier access to truly national property information.

### **1.3 Vertical lifestyles**

Urban densification, larger more complex buildings mixing commercial and residential, shared facilities and multi-level transportation necessitate 3D visualisation of the cadastre.

### **1.4 Personal Positioning**

Mobile devices will evolve to become advanced personnel positioning systems; used by citizens and property developers alike, to accurately locate land boundaries and the position of utilities and easements in relation to these boundaries.

### **1.5 Virtual Knowledge Environments**

Land information will need to be available ‘on-demand’ to anyone, anyplace, anytime. The community will want to be warned immediately of an impending threat to their property, such as fire, flood and storm.

The integration and accessibility of information is key to understanding rights, restrictions and responsibilities on land. In the near future information about land, and knowledge about what can be done with it and by whom, will be instantaneous; potentially warning us if we enter private, prohibited and unsafe areas.

The semantic web will play a significant role in simplifying and decoding complex data so that it is easily accessible and understood by the wider community.

### **1.6 Collaboration and Crowd Sourcing**

Volunteered geographic information will be an integral component of data management and in the collection of interests on land. Automated solutions will differentiate and integrate information from trusted and non-trusted sources.

Supply chains will be fully integrated allowing cadastral surveys, development approvals, legal discovery, financing and building construction to be organised by an individual on a single personal device

### **1.7 Political Environmental and Social Imperatives**

Our strategic goals are influenced by political, environmental and social policy including climate change, water security, land development, urbanisation, emergency management, social inclusion, affordable housing, environmental monitoring and global humanity.

The densification of our cities is creating a complex data management environment that is stretching the current capabilities of our cadastral system. Housing is set to increase in existing urban areas (ACT Government, 2011; SA Government, 2013) and become more diversified. Planning restrictions will be dynamic with some precincts commercial by day and residential by night.

Urban infill, high rise dwellings, new transit developments and the increase in number of interests on land will put pressure on our cadastre to become a central decision support tool for government and the broader community.

To support decision making our cadastre will need to communicate all rights, restrictions and responsibilities relating to land and do so in a way that is accurate, readily visualised and includes the dynamic nature of interests on land.

### **1.8 Community Expectations**

There will be a significant increase in the amount of legal and environmental information; and the community will expect to be able to easily access this information and be fully informed about associated interests on land.

## **2. A STRATEGIC LENS**

The drivers for change identified above provide a convincing case for future proofing our cadastral systems. However our strategy has been developed through the principles of a strategic lens which recognises the need to preserve the integrity of our current systems.

Changes are required and recommended however only if they do not 'break' the strengths of the current systems and preserve the enduring principles:

- Certainty in the spatial extent of ownership

- Uniquely defined land (and/or property) that is common to all registers– ownership, valuation, land use
- Integrity and security of the parcel boundary system
- Strong relationship between regulators and the industry
- Appropriate regulatory standards

### **3. FUTURE PROOFING THE CADASTRE**

It is essential that our cadastral system endures as a resource for the continued prosperity of future generations.

#### **3.1.1 Our Vision:**

A cadastral system that enables people to readily and confidently identify the location and extent of all rights, restrictions and responsibilities related to land and real property.

#### **3.1.2 Our Mission:**

To promote and support innovation and provide the leadership, coordination and standards necessary to deliver a unified cadastre that can be leveraged to find sustainable solutions to meet emerging needs and opportunities.

#### **3.1.3 Our Goals:**

Cadastre 2034 has five goals. Their purpose is to achieve a cadastre that:

1. is fundamental to land and property ownership and is sustainably managed;
2. is multipurpose, truly accessible, easily visualised, and readily understood and used;
3. is fully integrated with broader legal and social interests on land;
4. provides a digital representation of the real world that is survey accurate, 3-dimensional and dynamic; and
5. is a truly federated cadastre based on common standards.

These goals are described below.

## **4. THE GOALS**

### **4.1 A cadastre that is fundamental to land ownership and managed sustainably**

This goal necessitates preservation of our current strengths and integrity while striving to improve efficiency and effectiveness of management.

#### **4.1.1 Outcomes:**

- Processes, data and systems have integrity and resiliency.
- Systems function in a way that maintain and enhance quality of life and the environment.
- Financial and risk management practices are sound.
- Social and intergenerational equity is preserved.
- The community has a strong sense of trust in the cadastral system.

#### **4.1.2 Actions and Innovations:**

- Optimise spatial data supply chains
- Develop a sustainable business model to manage and upgrade the cadastre including intellectual property management, return on investment and funding.
- Reform business and automate processes to reduce the amount of effort required per land transaction, eliminating red tape and reducing consumer compliance costs.
- Ensure record keeping, data storage, legislation and intellectual property and life cycle management systems are aligned with technological advancements.
- Build skills and knowledge resources aligned to new methods.
- Invest in public/private partnerships to collaboratively maintain the cadastre.
- Develop a participatory model to include community volunteered data for sustainable data collection of land and property features.

#### **4.2 A cadastre that is multipurpose, accessible, easily visualised and readily understood and used.**

This goal aims to maximise the potential of the cadastre by creating more options for its use so that it can be leveraged by society economically, socially and environmentally.

##### 4.2.1 Outcomes:

- Open and transparent access to information, balanced with respect for individual privacy.
- Customer-centric service delivery.
- A digital cadastre that can be utilised in multiple environments and easily combined with other information.
- A digital cadastre capable of being readily visualised and understood.
- Current information is available in real-time, and easily leveraged and analysed.
- A digital cadastre that is interoperable with global standards.

##### 4.2.2 Actions and Innovations:

- Position the cadastre to deliver on sustainable development objectives by enabling its use in multiple information environments.
- Establish a customer-centric service delivery approach.
- Develop methods to serve the cadastre straight to the desktop or portable device of anyone, anytime, anywhere - to maximise use.
- Improve the discoverability of the cadastre using next generation semantic web technologies.
- Make the reliability of data clear to the community of users so they can make informed decisions on what data will best suit their needs.
- Understand the cadastral system's key value streams in delivering future business opportunities to a modern society.
- Develop an investment framework to stimulate new industry through the development of new products and services.
- Present the cadastre in virtual knowledge environments so the community can draw the most value from its application.

### **4.3 A broader cadastre integrated with legal and social interests on land.**

This goal aims to integrate the cadastre with knowledge about registered and unregistered land-related rights, restrictions and responsibilities so that people can interact and make wise decisions about land.

#### **4.3.1 Outcomes:**

- A cadastre integrated with all rights, restrictions and responsibilities on land and real property.
- The spatial extent of all interests on land and property are represented unambiguously and depicted in a manner that meets the requirements of evolving tenures.

#### **4.3.2 Actions and Innovations:**

- Extend the cadastre to include the spatial extent of de facto and de jure rights and interests on land and marine environments.
- Develop methods and standards to depict and manage indeterminate ‘fuzzy’ boundaries related to rights, restrictions and responsibilities, such as noise levels.
- Build integrated models to enable vertical integration between data themes depicting interests on land.
- Develop accuracy standards and models for the definition and depiction of all rights, restrictions and responsibilities in the broader cadastre.
- Build a capability to manage the dynamic nature of rights, restrictions and responsibilities, such as daily and seasonal variations.
- Develop validation and automatic linking tools for the inclusion and integration of third party data.

### **4.4 A digital representation of the cadastre that is 3-dimensional, dynamic and survey accurate**

This goal aims to modernise the digital representation of the cadastre by incorporating survey accurate, time series, and 3 dimensional data to capture the complexity of our environment

#### **4.4.1 Outcomes:**

- A digital cadastre that is survey accurate.
- A 3-dimensional digital cadastre that aligns with the real-world.
- A legislative framework that underpins a 3-dimensional cadastral and land registration system.
- A digital cadastre that is capable of depicting dynamic (4-dimensional) elements.

#### **4.4.2 Actions and Innovations:**

- Develop tools and legislation to model, manage, transfer and visualise a 3 and 4-dimensional property data.
- Apply new technologies to improve positional and semantic accuracy of digital cadastral data, and the currency of the digital cadastre through implementation of automated processes.

- Implement a demand driven spatial upgrade to achieve survey accurate boundary representation in priority areas.
- Align legislation and survey laws with a 3-dimensional cadastre.
- Develop accuracy standards and models for the depiction of 3-dimensional property (below and above ground).
- Propagate the dynamics of the geodetic reference system to cadastral boundaries in a way that is accurate and transparent to users.
- Improve the integration of the vertical datum to support complex 3 and 4-dimensional depiction of rights, restrictions and responsibilities.
- Skills development for land surveying professionals to ensure 3-dimensional system elements are maintained with integrity.
- Develop a Road Map to manage the transition to new technologies.

#### **4.5 A federated cadastre based on common standards**

This goal aims to operate in the national interest and equip society with broader land and real property models to deal with local, cross-jurisdictional and global challenges. Australia has many different jurisdictions with different legislation presenting challenges for those with cross border or national interests. The goal recognises that this is not dissimilar to international environment and that our systems should be able to integrate internationally.

##### 4.5.1 Outcomes:

- Unified access to jurisdictional cadastres in real-time.
- Uniformity in policies, standards, guidelines and legislation.
- Roles of custodianship and stewardship of a federated cadastre are clearly defined..

##### 4.5.2 Actions and Innovations:

- Create harmonised spatial data management processes and federated data models leading to national outcomes.
- Develop a Data Access Framework that supports common access to a consolidated version of the broader cadastre.
- Establish an agreed policy direction and Governance Framework for the cadastre (land and property data).
- Develop standards and guidelines to facilitate data discoverability, access and integration, nationally.
- Understand industry and community needs to enable the delivery of future business opportunities in a broader marketplace.

## **5. CONCLUSION**

The Australian Cadastral Strategy was released in early April as a consultation draft. ICSM is keen to receive comment and feedback on this document. A digital version of the document is available via the ICSM web site at [www.icsm.gov.au](http://www.icsm.gov.au) . Feedback can be made from this site.

ICSM notes the highly regarded FIG publication ‘Cadastre 2014’ (Kaufmann, J. and Steudler, D) and respectfully suggests that in 2014 it would be timely to develop a new 20 year vision. It is hoped that the draft Australian strategy and the recently finalised New Zealand strategy will form useful references should this be undertaken.

## 6. ACKNOWLEDGEMENT

ICSM engaged Geospatial Frameworks to assist in preparation of the draft strategy. Their contribution to the strategy and parts of this paper is acknowledged.

## REFERENCES

**ACIL Tasman** (2008) The Value of Spatial Information: The impact of modern spatial information technologies on the Australian economy available at <http://www.crcsi.com.au/Resources/general-interest> ,accessed Oct 2013.

**ACIL Tasman** (2013) Surveying and Geospatial Workforce Modelling: Potential Skills Gap Analysis for Queensland in particular and estimates extrapolated up for Australia, August 2013, available at <http://www.crcsi.com.au/Resources/general-interest>: assessed Oct 2013

**ACT Government** (2011) Draft Act Planning Strategy: Planning for a Sustainable City, available at <http://www.actpla.act.gov.au> , accessed September 2013.

**Australian Bureau of Statistics** (2012) ABS releases state land account for the first time, Media Release, available at <http://www.abs.gov.au/ausstats/abs@.nsf/MediaRealesesByCatalogue/5EE0D50E58E4F864CA257AD2000F1551?OpenDocument> , accessed October 2013.

**Australian Bureau of Statistics** (2013-1) Housing Finance, Australia, available at <http://www.abs.gov.au/ausstats/abs@.nsf/mf/5609.0>, accessed January 2014.

**Australian Bureau of Statistics** (2013-2) Total Value of Dwelling Stock, available at [http://www.abs.gov.au/ausstats/abs@.nsf/Products/6416.0.55.002~2013~AppendixTotal+value+of+the+dwelling+stock+data+\(Appendix\)?OpenDocument#32242413221899494850](http://www.abs.gov.au/ausstats/abs@.nsf/Products/6416.0.55.002~2013~AppendixTotal+value+of+the+dwelling+stock+data+(Appendix)?OpenDocument#32242413221899494850) , accessed October 2013.

**Australian Bureau of Statistics** (2013-3) Gross Value Added by Industry, available at <http://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/5204.0?OpenDocument> ,Table 5 accessed January 2014.

**Bureau of Meteorology** (2007), Water Act 2007, Australian Government, available at <http://www.comlaw.gov.au/Series/C2007A00137> , accessed October 2013

**Forbes** (2013) How Self-driving Cars will Change the World, available at <http://www.forbes.com/sites/pikeresearch/2013/11/13/how-selfdriving-cars-will-change-the-world/> , accessed December 2013.

**FIG - International Federation of Surveyors** (1995) Statement of the Cadastre, available at [http://www.fig.net/commission7/reports/cadastre/statement\\_on\\_cadastre.html](http://www.fig.net/commission7/reports/cadastre/statement_on_cadastre.html) , accessed December 2013.

**Google** (2014) Welcome to a World through Glass, available at <http://www.google.com/glass/start/what-it-does/> , accessed January 2014.

**Hellen, L** (2013) Discussion Paper, 3dQLD - Building the boundaries and positioning Queensland, Version 1.1, available at <http://3dqld.org/> , accessed October 2013, pp16

**Intergovernmental Committee on Surveying and Mapping (ICSM)** (2009] Fundamentals of Land Ownership, Land Boundaries, and Surveying, available at [http://www.icsm.gov.au/cadastral/Fundamentals\\_of\\_Land\\_Ownership\\_Land\\_Boundaries\\_and\\_Surveying.pdf](http://www.icsm.gov.au/cadastral/Fundamentals_of_Land_Ownership_Land_Boundaries_and_Surveying.pdf) , accessed December 2013

**Intergovernmental Committee on Surveying and Mapping (ICSM)** (2014] Cadastre 2034: Powering Land and Real Property, Cadastral Reform and Innovation for Australia – A National Strategy, available at available at <http://www.icsm.gov.au/>

**Kaufmann, J. and Steudler, D.,** (1998), Cadastre 2014: A Vision for a Future Cadastral System, International Federation of Surveyors, Switzerland.

**Khoshnevis, B** (2012) Contour Crafting: Automated Construction, available at <http://www.wimp.com/printerhouse/> , video, accessed October 2013

**Land Information New Zealand** (2014) Cadastre 2034: A 10-20 Year Strategy for Developing the Cadastre: Knowing the Where of Land- Related Rights, available at [http://www.linz.govt.nz/sites/default/files/docs/cadastre\\_strategy\\_web4.pdf](http://www.linz.govt.nz/sites/default/files/docs/cadastre_strategy_web4.pdf)

**Ordnance Survey** (2013) GeoVation, available at <http://www.ordnancesurvey.co.uk/innovate/showcase/index.html> , accessed October 2013

**Rohan Bennett, Abbas Rajabifard, Mohsen Kalantari, Jude Wallace, Ian Williamson** (2011) Cadastral Futures: Building a New Vision for the Nature and Role of Cadastres, International Federation of Surveyors, Article of the Month – June 2011

**SA Government** (2013) The 30-year plan for greater Adelaide, available at <http://www.plan4adelaide.sa.gov.au/index.cfm> , accessed September 2013.

**Streetmix** (2013) <http://transportblog.co.nz/2013/08/10/theawesome-streetmix/>

## **BIOGRAPHICAL NOTES**

Bill Hirst has a Bachelor of Surveying degree from Uni of New South Wales and a Master of Surveying Science from the same university, and a graduate diploma in management from Uni of Western Sydney.

He is a member of the Intergovernmental Committee on Surveying and Mapping (ICSM), past chair and now ICSM sponsor of the Permanent Committee on Cadastre, co-chair of the ACT Place Names Committee, Observer on the NSW Board of Surveying and Mapping and a director of PSMA Australia.

Bill has working in a wide variety of public sector surveying roles including determining the location of Australia's maritime boundaries. In 2007 he accepted the position of Surveyor General for the ACT.

## **CONTACTS**

Bill Hirst  
Environment and Sustainable Development Directorate  
ACT Government  
GPO Box 1908  
Canberra  
ACT  
AUSTRALIA  
Tel. +61 2 6207 1965  
Fax + 61 2 62071615  
Email: [bill.hirst@act.gov.au](mailto:bill.hirst@act.gov.au)  
Web site: [www.actpla.act.gov.au](http://www.actpla.act.gov.au)