

NEW ROLES OF LAND ADMINISTRATION SYSTEMS

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SUMMARY

This paper sketches the key issues in the history of land administration in terms relevant to the experiences of countries in the Asia Pacific Region. It is a first step in building a national land administration vision and is influenced by empirical research on European and Australian approaches. The vision is especially influenced by three trends in global land administration theory and practice, especially during the last five years and include: sustainable development; spatial enablement; and theoretical achievements in land administration.

The challenges for modern land administration systems and in modern government are presented including the roles of land administration in formalizing land markets, implementing and understanding regulations and restrictions, and changing the nature of ownership. The role of spatial enablement and understanding the potential of *iLand*, the concept of integrated spatially enabled land information available on the Web, are central to understanding the national vision for land administration in Australia. Finally, future directions within technical and operational issues and collaboration and capacity building are presented to assist creation of a new land management model and national vision for spatially enabled land administration by countries in the APR.

INTRODUCTION

A new discipline, called land administration, is now available to assist land management. Land administration began as a coherent approach to building land related infrastructure after WWII. The significance of organising land information (Dale and McLaughlin 1988 and 1999) and the use of fundamental tools of the cadastre (or parcel map) and registration systems to deliver security of tenure and alleviate poverty (UNECE 1996) remain historical but vital land administration themes. The discipline received its formal name in 1996 through the efforts of the Meeting of Land Officials (MOLA, but now the Working Party on Land Administration or WPLA) of the UN Economic Commission for Europe. This discipline uses administrative, technical and policy tools to assist management of land, built up from traditions of surveying and cadastral organisation, land titling administration, tenures and related theories. Most activities of land administrators concern implementing conditions appropriate for land markets because effective land markets are sought-after by most governments, even in communist countries. Along

with theories of property and economics which helped conversion of different tenures into commercialised, individual ownership, these tools formed the infrastructure for management of processes that delivered national capacities to build wealth out of land (Wallace and Williamson 2006a). Thus many countries seek to emulate this history and build similar infrastructure of institutions, tenures and capacities in the hope that successful formal land markets will emerge.

Land administration systems (LAS) started because governments needed coherent and fair tax collection systems, then they developed to service land markets. Their basic functions are to organise processes associated with land tenures, values, uses and development. Their primary tools are surveying, registration systems, and databases run by government organisations. The importance of land administration increased after 1990, when land administrations in modern democracies emerged from their technical focus to engage professionals from the disciplines of engineering, economics, political and social sciences, law and computer technology as international organisations and national governments struggled to deliver land and food security and to build land markets.

Land administration is now a multi discipline endeavour with a focus on land management, delivery and organisation; it is also providing the supporting framework for trading in complex commodities. An analysis of how modern land markets are able to invent and support a constant stream of new commodities shows how fundamental infrastructure in the prosaic activities of tenure, use, development and value underpins these wealth accelerating activities (Wallace and Williamson, 2006).

Though land administration as a coherent field of study is new, its antecedents in surveying and cadastres are hundreds if not thousands of years old. These roots lie in surveying, the technical identification of land on the Earth's surface, itself with a history of 4000 years. Land administration as a discipline now offers a range of strong, effective, technical tools for improving land management (Williamson 2001). In this modern world, the surveying heritage remains apparent in the engineering approach to designing, building and managing LAS for explicit purposes of achieving sustainable development. The arrival of new technologies, especially since 2000, offers much needed new opportunities for delivering the LAS functions provided the international trends are understood. These new technologies offer a much larger capacity for land administration systems (LAS) to service government and deliver sustainability than that identified in existing literature. This was principally because of a much more practical approach to sustainability issues. Ingredients of land administration systems relevant to countries in the Asia Pacific Region (APR) include

- 1 Sustainable development objectives within land management
- 2 Spatial enablement technologies
- 3 Achievements in land administration in theory and practice.

THE LAND MANAGEMENT CHALLENGE

Sustainable development

Building markets is but one aspect of modern land administration. Now the accepted theoretical framework for all land administration systems is delivery of sustainable development - the triple bottom line of *social, environmental and economic development*, together with a fourth requirement of *good governance*. Foundational documents are the joint UN-FIG **Bogor Declaration on Cadastral Reform** (UN-FIG 1996) and the joint UN-FIG **Bathurst Declaration on Land Administration for Sustainable Development** (UN-FIG 1999). Sustainable development is delivered through a theoretical framework of the land management paradigm (Enemark and others 2005). In this paradigm, land management capacity is the essential contributor to national stability, environment protection and economic success. Among the 220 or so nations of the world, the Western democracies are the most successful land managers, though many of them admit that even their systems can be vastly improved. They built coherent land distribution systems which proved to be adaptable. These systems formed the basis of efficient land identification, land taxation, formal land registration and transaction tracking; and ultimately effective land markets. In developed countries these processes of identifying, registering, taxing and marketing are managed by land administration systems (LAS), though the tools used are historically, politically and technically variable. Sustainability is the agreed goal for national governments.

The 'triple bottom line' of *economic, environmental and social* sustainability is now expanded with the inclusion of *governance* standards to ensure institutional and corporate ethical performance in the longer term. Implementation of 'quadruple bottom line' sustainable development requires combined activities across the whole of government, private sector and citizens. Careful management of land related activities on-ground, in organisations and in government is crucial for delivery of sustainability. New technologies offer opportunities for reorganisation of land related activities and delivery of targeted land information for government and business decisions to deliver sustainability.

The land management paradigm

Land management is a phenomenon present in all societies. It underpins distribution and management of a society's largest asset: its land. For Western democracies with highly geared economies, land management, with a central land administration component, is a major activity of government and the private sector, the foundation of highly geared land markets and delivery of land. The land management paradigm below allows everyone to understand the *land administration component* of land management and how LAS institutions relate to the historical circumstances of a country and its policy decisions. The paradigm also provides a stable focus for comparison and sharing of national, regional and international efforts to manage land. More importantly it provides a framework to facilitate the processes of integrating new needs into traditionally organised systems without disturbing the fundamental security these systems provide.

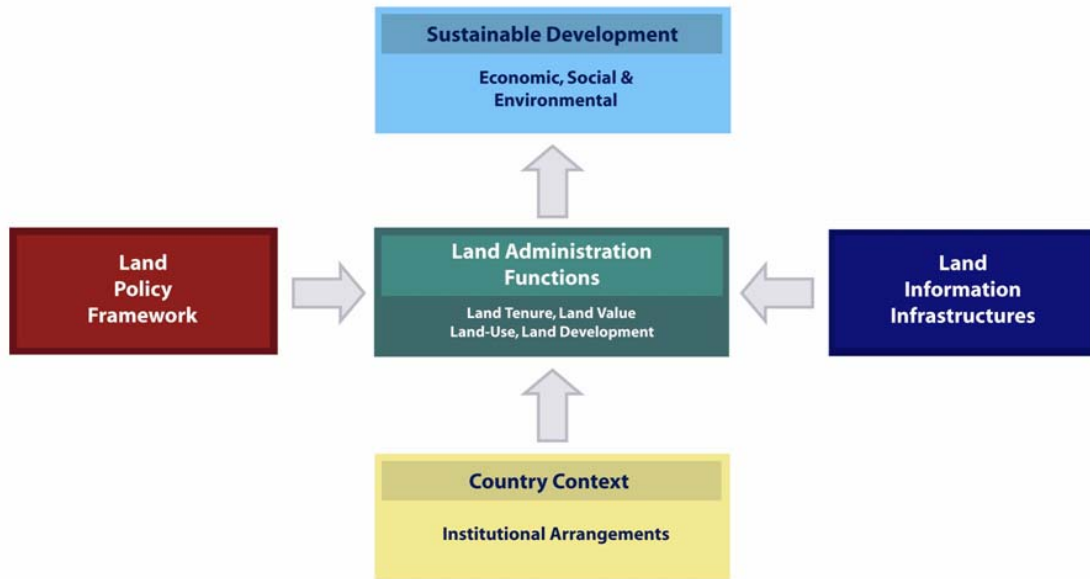


Figure 1 - The land management model (Enemark, Williamson and Wallace, 2005)

Integrated land management

No nation can build land management institutions without thinking about integration of activities, policies and approaches. Cost and overheads of technology provide additional motivations. The rise of new spatial technologies offers exciting opportunities for new approaches. The question facing modern land administrators is then how to proceed to the future. The solution involves reducing the question into components or tools that are achievable, within a holistic future plan or vision.

The cadastre

For countries in the APR, the cadastre is a new, but simple to understand, concept: it is a map of the parcels and land arrangements now available in digital form in computers showing how a society organises its land into useable pieces with interconnecting roads and services (Figure 2). It was developed by digitising the old paper survey plans and maps, making them fit, and by generating new parcels through much more accurate modern

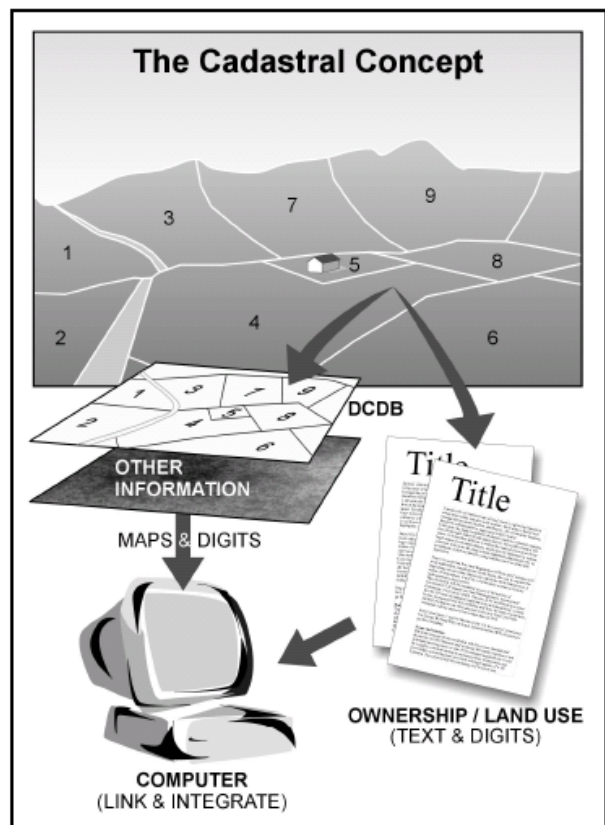


Figure 2 – The cadastral concept

processes. Fitting the old records with the new is ongoing and varies in each system. In Europe cadastres are much older and their functionality is much more extensive. Their age makes them understandable to their communities and they include much more information, including buildings.

The cadastre is at the operational core of LAS. Modern digital cadastres are much more central to governments because they are spatially enabled and allow computers to accurately identify where a feature, such as a street or a house, is on the globe. They therefore change computerised data into intelligible, people-friendly information and present it in visual (picture) formats. By adding geocoded addresses, cadastres can show how parcels of land are arranged into properties and businesses. Imposing aerial images (photos or satellite images) in the equivalent scale allows people to look up pictures of their homes and farms to show current and historical uses. In some jurisdictions, cadastres are survey accurate (ACT, south western Western Australia, in urban and peri-urban New Zealand). In others (Victoria, NSW), they are generally not. For Australia, the necessity of survey accuracy in the cadastre is frequently debated because it is expensive, relative to the size of the national land mass. In Europe, the long history of surveying, meticulous standards of on-ground surveying, public respect for and understanding of surveying and close density land uses have long ago ended the accuracy debate. For high value land, survey accuracy in the cadastre is a national asset.

The unique capacity of cadastres to provide the people friendly layer of land information makes them the layer that no modern LAS can do without. They are nevertheless expensive to build and to maintain. This is why they must be “built once, and used many times”. They must also be cleverly designed to meet the needs of modern governments concerned about sustainable development.

Technology as a driver of change in LAS

Since 1990, land administration in modern democracies emerged from a technical focus to engage professionals from the disciplines of engineering, economics, political and social sciences, law and computer technology as international organisations and national governments struggled to deliver land and food security and to build land markets.

The most important changes in LAS were driven by technology, principally the move from paper records to computerised systems. In future, geographic information systems, spatial data infrastructures, multi-purpose information, alignment of information about the built and natural environments, and layering of aspatial information with the stable framework of location data will create new opportunities.

In creating this dynamic new future, the previous concentration on institutions of government will be widened by engagement of utilities, spatial scientists, and other businesses in the construction of land information products. The transitions are shown in Figure 3 below.



Figure 3 - IT in LAS

This figure shows a potential future for modern land administration, called *iLand*. It emphasises the dynamism in people to land relationships that need much more modern management tools and approaches than the standard land administration approaches built in the days of relational data bases and small capacity computers. Given the technological trends, governments are moving from web enablement of information needs, to *eLand* where information is much more interoperable, accessible, and where services and processes are managed in the internet environment. *iLand* takes this to the next stage in which government organisation of processes and information utilises the new and emerging technologies in spatial recognition. *iLand* requires a comprehensive approach to using spatial enablement throughout government, and especially in land administration tasks, similar to that shown in Figure 4 below.

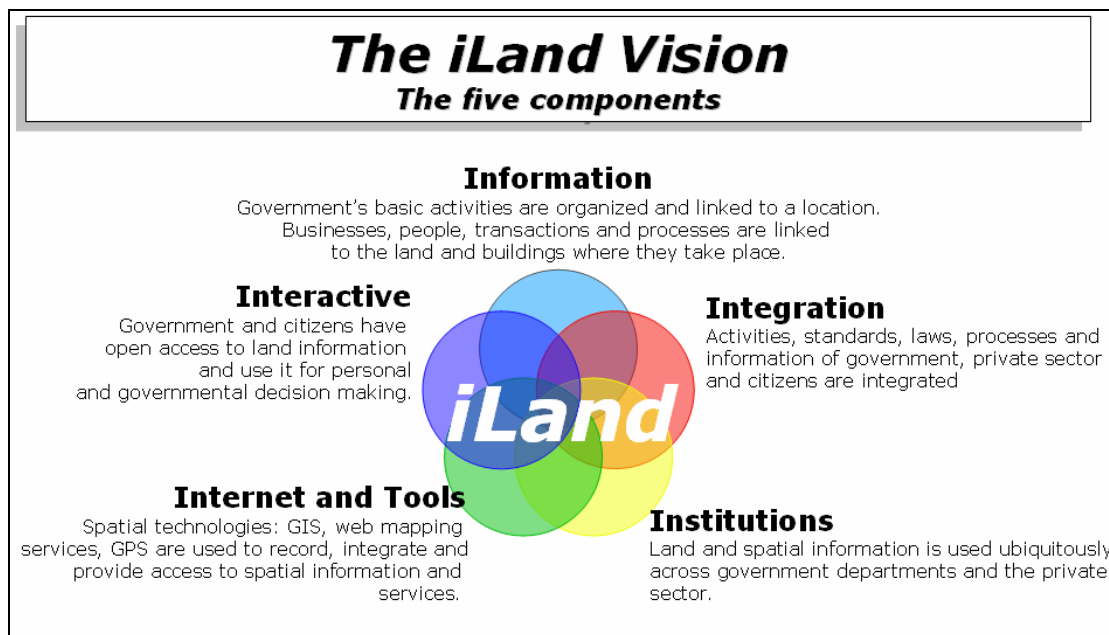


Figure 4 - The *iLand* vision

The *iLand* vision identifies the opportunity for spatially enabling government and better using information. In *iLand* government information systems are spatially enabled, and the “where” or location provided by spatial information is regarded as a common good made available to citizens and businesses to encourage creativity, efficiency and product development. This makes spatial information, which describes the *location* of objects in the real world and the *relationships* between objects, into both an enabling technology and an enabling infrastructure for modern society. *iLand* starts by relying on the technical skills of the professionals in the computer world, and the experts in land identification in surveying and geography. The *iLand* vision then

focuses on the needs of everyone else, including governments as they seek to implement land policy and deliver sustainability. The current issues facing government identified below will be much better addressed by this information infrastructure.

Capture of the opportunities created by new technology places a new emphasis on the information generated by parcel maps – the cadastre. The way people use land for their homes, business, farms, factories, and recreation are reflected in cadastre. The spatially representation of these uses in a cadastre is scientific because it is collected systematically by surveyors. The human scale and reliability of this information makes it the most significant layer in the SDI. This importance is reflected in figure 5 below.

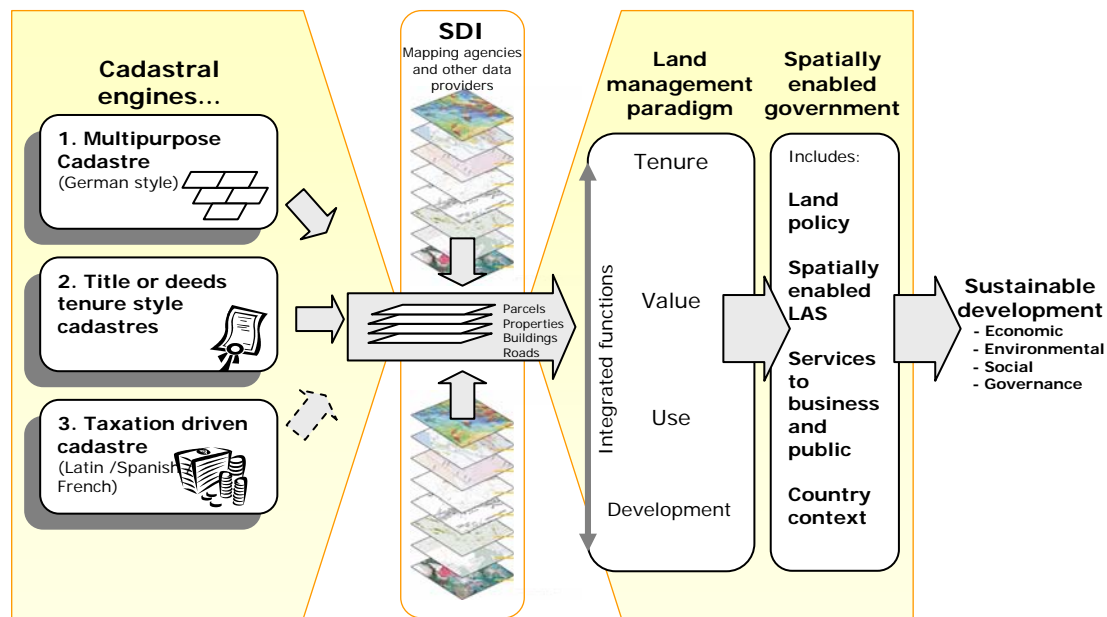


Figure 5 - The cadastre as an engine of land administration systems

The “butterfly” diagram.

CHANGES IN MODERN LAND MARKETS

Implementing and understanding regulations and restrictions

Land uses over time must be managed to mitigate long term deleterious impacts. Australian problems of erosion, salinity and acidity are documented. As an APR country, these problems are far from specific to Australia. Most countries in the region share similar environmental management issues. Over time, attempts to manage these shared impacts by regulating tree clearance, water use, chemical use, building standards and so on led to very great increases in the amount of law, regulation and standards applying to land based activities. This is a world wide experience. Suggestions that information about restrictions on land should be included in LAS are common and international. The idea of including “all restrictions in the land register” was a first-grab solution. New technology now offers more alternatives. Modern registries are adapting to integrate these new opportunities into their more traditional functions.

Changing the nature of ownership

Nations are building genuine partnerships between communities and owners, so that environmental and business controls are mutual endeavors. Rather than approach them as restrictions, the nature of ownership is being redesigned to identify owners' opportunities within a framework of responsible land uses for delivery of environmental and other gains that benefit the whole of society. Australia's National Water Initiative and the National Land and Water Resources Audit build in the realisation that activities of one land owner affect others. The development of market based instruments such as EcoTenders is an Australian attempt to incorporate environmental consequences into land management by market based instruments (MPI). Australia's implementation of "unbundling" of land, to create separate, tradeable commodities is now strongly established. These separate commodifications of land based opportunities are built into existing land administration systems as far as possible, but no comprehensive analysis of their impact on property theory is available.

For the Europeans, the social responsibilities of land owners have a much longer heritage, with the exemplar provision in the German Constitution insisting on the land owner's social role. The nature of land use in The Netherlands, given some 40% of the land mass is below sea level, presupposes high levels of community cooperation and manages land ownership responsibilities for the broader common good. The long history of rural villages in Denmark and public support for the 70% of Danes who live in rural areas also demonstrates effective collaboration in sustainable development.

Whatever the mechanism, modern land ownership has taken on social consequences, at odds with the idea of an absolute property owner. Australia and Europe take very different approaches to management of the social nature of land. While Europe is generally approaching land management as a comprehensive and holistic challenge requiring strong government information and administration systems, Australia is creating layers of separate commodities out of land and adapting existing LAS as much as possible to accommodate this trading without a national approach.

New trading commodities – unbundling land

Demands on traditional systems increase when commodification (or commoditization in the US) is extended beyond land ownership. In Australia, the process is known as "unbundling" – separation of the new tradeable products separate from interests in land itself. Biota, carbon credits, planning and building permissions, and water and others require similar infrastructure to permit trading. In some cases, the new product is integrated into existing land registration programs, or into similarly designed systems.

From the European perspective, where unbundling is unfamiliar, the important issues are to retain and extend capacity to deliver sustainable development within these separated markets and to provide administrative frameworks which permit holistic management of the nation's most valuable resources.

Building cognitive capacity and competencies

Engagement of beneficiaries in modern land markets requires high levels of understanding about and trust in activities, products and services. The ability of a

nation state to provide administrative systems that achieve public confidence in the operations of land markets is relatively rare. Only about 30 nations of the world do this very well. Achievement of trust and education of participants in land markets is the unrecognised but remarkable outcome of land administration in Australia and Europe. In terms of delivery of good governance and civil peace, the comparison between societies in these countries and others in the world is stark.

The capacity of LAS to deliver services which feed back into the democratic functioning of their nations needs to be recognised. The public role of LAS is often forgotten, despite the importance of this consequence of effective administration.

Equitably and efficiently taxing land and collecting relative land information

All developed countries rely on land driven taxation streams. Vigorous land markets and the development of complex commodities require much more sophisticated systems of land taxation, stamp duty on transactions and ownership taxes. These systems depend on information about individual owners, times of purchase and sale, values and prices on purchase and sale, expenditure during ownership, trust interests, land uses, and other variables. While the core information is the unchanging information about the land parcel, governments now rely on a range of additional information that is highly varied and relative to situation. This relative information is the key to land tax, income tax, capital gains tax and goods and service tax activities; and to national welfare systems. The collection and maintenance of this information currently depends on self reporting and database organisation. However, new opportunities exist for spatially enabling systems to assist management of relative land information.

Supporting complex markets

Insurance, corporate and banking operations in nation states developed separately from land administration. This was understandable, given the history of paper based land administration systems. However the computerisation and spatial enablement of land registers, cadastres and related information (valuation, planning and buildings and development activities) create far more opportunities to build information systems capable of servicing these other essential commercial spheres. In European countries land registration systems provide much more information to mortgage providers than is occurs in Australia. Capacity to provide information to the insurance industry is also underdeveloped.

Managing permissions and licences

Government management of and assistance to business has increased since WWII. Information needed by business and the public includes permissions, licences and approvals as well as restrictions. A georeferenced business address file, corporate operating and registered offices, business types and licences is already under consideration in Australia in the Public Sector Mapping Agency (PSMA). Australia's capacity to service local business is recognised as high and the nation does well on regulatory comparative analysis (World Bank Report, 2004, 2005).

Improving participation by business and citizens

National, state, territory and local governments increasingly provide information about planning initiatives, citizens facilities and other activities electronically, through initiatives generically called *eLand*. For example, the Australian government increasingly uses Web based systems to provide services in taxation, welfare, and information.

The major Australian effort in *eConveyancing* is a fundamental change from mere delivery of information central to *eLand* initiatives, to interactive service provision across sectors of land administration and banking via the Web. The change is potentially as fundamental as Internet Banking was to the banking sector. This pioneering change reflects wider government use of the Web to inform and engage citizens in decisions.

Australian land management has multiple examples of interactive land management programs, with Western Australian shared land information platform, SLIP, in the Department of Land Information, providing an exemplar example. CSIRO, GeoScience Australia and PSMA provide highly successful examples of programs, indicating imaginative and collaborative digital solutions to information and service problems.

SPATIAL ENABLEMENT

Understanding the potential of *iLand* and spatial enablement requires an appreciation of how spatial enablement works. On one standard, spatial enablement is just one form of interoperability. It is however far more energetic and offers opportunities for visualisation, scaleability, and user functionality. The capacity of computers to place information in on-screen maps and to allow users to make their own enquiries has raised the profile of spatial enablement. New applications of this technology (mobile phones, vehicle tracking, digital cameras, and intelligent systems in asset management) are developing annually. These rely on the underpinning of spatial information in cadastres and large scale topographic maps (such as the large scale topographic map of The Netherlands). These innovations work effectively when they are supported by a digital cadastre.

The benefits of spatial enablement of the core cadastral layer are -

- Maintenance and sharing of the core information layer – once created it is used many times – already used in thousands of applications
- Attachment of information to images of parcel and property configurations
- Accurate identification about the place or location of one activity in relation to other places in ways that are understandable by ordinary and non-technical people
- Capacity of businesses and citizens to understand, interrogate and manipulate information in the computer
- Inclusion of layers of geo-referenced information in the computer systems, despite their distinct sources, systems and owners, and achieve interoperability between the layers
- Integration of government information systems
- Provision of seamless information to institutions and government

- Incorporation of aspatial and relative information into maps permitting the location of that information to be realised and visualised
- Ultimately managing information through spatially enabled systems, rather than databases.

Spatial enablement offers land administration a revolution equivalent to the conversion of paper files to digital systems of twenty years ago. The concept of *iLand* was developed to assist people to understand the capacity of spatial information to deliver new services and to assist better land information management. *iLand* will be a central component of new land administration systems.

FUTURE DIRECTIONS

These contextual influences, particularly unbundling land and water interests and development of complex commodities, put new pressures on a nation's LAS framework, both conceptually and institutionally. Simultaneously, new technologies for organising information, visualising information and allowing users to build their own versions of systems to suit personal needs will impact on organisation of geospatial and georeferenced information and its source agencies. The core activities of land registration, planning and valuation will have more significance than ever before. *Taking into account the views of international and Australian experts in an Expert Group Meeting on "Sustainability and Land Administration" held in Melbourne in 2005* (http://www.geom.unimelb.edu.au/research/SDI_research/EGM/), specific directions for the future are summarised below.

Issues in sustainable development

The extensive use of ICT in LAS will not automatically lead to sustainability. Whole of government approaches are needed. The most crucial factor in delivery is the cultural understanding of why sustainability is important and general agreement on how to achieve it. To achieve a comparative international focus, reflecting the cross-jurisdictional nature of sustainability issues, an agreed model or paradigm of land management was proposed and critically reviewed. The key ingredient, country context, highlighted the largest observable differences between modern European democracies and Australian counterparts.

The European approach to land is based on social responsibilities of individual land owners. The owners are regarded as temporary managers rather than absolute owners. Australian efforts focus on economic tools (especially "unbundling" of interests in land) while Europe focus on holistic management for inter-generational sustainability and for maintenance of a strong and dedicated rural population charged with land management responsibilities. From the European perspective, APR countries need inter-jurisdictional capacity for holistic management, especially because of the scales of challenges, density of its populations, and limited human capacity and resources. Technical solutions are even more essential to compensate for the relative thinness of people skills.

This is especially apparent in marine management were a regional approach to marine cadastre as a management tool for the Asia Pacific region is identified as a major

focus. Similar inter regional approaches are essential to deal with water scarcity and quality issues.

Professional, organisational and government issues

Europeans use parliaments to create land policy for citizen implementation and in contrast to Australia where governing parties and high level bureaucrats predominate in policy identification and implementation. Europeans are used to protracted, discursive and participatory processes in policy articulation and implementation. The extended role of surveyors in Europe reflects the social value attached to land and related professionals. Surveyors and spatial engineers are among the leaders in national and regional land policy making and, as a result, national LAS institutions have clearly defined international roles. This provides a valuable lesson for APR countries.

The influence of the European Union as a coordinating agency is evident and has no APR equivalent. EUROGI and INSPIRE are significant influences on national policy, institutional functions and selection of instrumental tools. Agricultural sustainability is a strong political, social and economic driver in Europe, understood by urban and rural populations. Cultural absorption of key LAS tools, particularly surveying and the cadastre, and the much broader information base in cadastres, make it easier for Europeans to move into spatial data infrastructures, SDI, than in APR countries.

The engagement of senior policy makers in LAS is therefore more difficult in developing and newly industrialized countries. The role of the private sector in driving spatial information awareness is evident and increasingly recognised (in NSW, for instance, by being included within the regulatory framework). The work of the inter-jurisdiction and national agencies is well known and creating significant opportunities for both government and private sectors. Initiatives among the traditional agencies are also significant: in Australia, for example, *eConveyancing* would not proceed without national cooperation among the registries and banking sector.

Encouragement of private sector engagement in the social and environmental, in addition to economic, aspects of sustainability by spatial industries is needed. The much broader role undertaken by land policy experts and surveying professionals is demonstrated by their work in international land projects, especially in developing countries.

Technical and operational issues

The language of technical discussions substantially inhibits understanding among non-technical people. While land administration is now clearly multi-disciplinary, it still operates in a world of closed semantics. Meanwhile, efforts aimed at creating data models and “authentic” registers (national scale registers for people, businesses, properties, vehicles and so on) need much wider support.

In this environment of language and communication issues, the achievements in new technologies are important. These achievements can increase the level of political and public interest in LAS and its possibilities. At the same time, more technical and less understood initiatives remain essential. Of the many now being investigated in Australia, cadastral modelling as a universal method of facilitating data

interoperability, including 3D (height) and 4D (time) dimensions, offers potential for seamless presentation of land information.

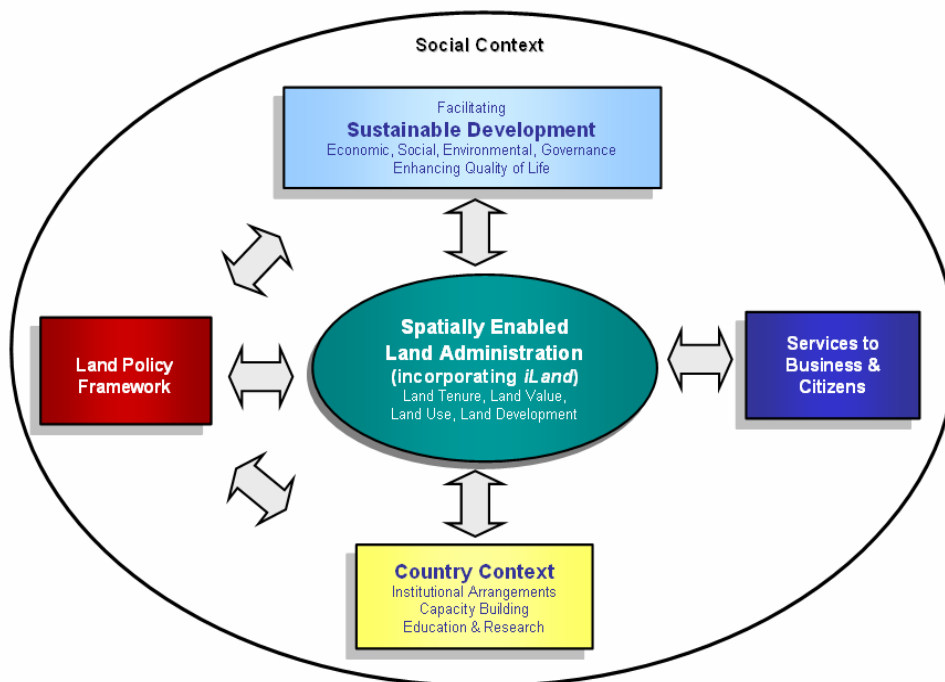
The missing link: the public

Given the need to *demand drive*, (that is respond to users' needs), rather than *supply drive*, change, engagement of the public in decision processes is essential. Sometimes a network of appropriate people through reference groups, or direct engagement of stakeholders in decision processes, is appropriate.

APR countries have not yet introduced comprehensive monitoring and evaluation of their efforts to deliver sustainability. Though Global Reporting Indicators (GRI) are available, their systematic implementation in LAS does not occur in the national jurisdictions. In the GRI environment, engagement of the public is axiomatic. To incorporate this wider perspective, the next stage of the paradigm is represented in Figure 6 below.

Collaboration and capacity building

Collaborative and collegiate exploration of the future paths is necessary. While Europeans enjoy considerable opportunities for these activities, APR countries offer fewer forums. More opportunities for structured and broad-based collaborative efforts are needed.



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- **Land:** holistic term including property as an asset and natural resources
 - **People:** interact with land administration system through rights restrictions and responsibilities
 - **Sustainability:** facilitated through good governance in LAS
 - **Innovation:** achieved through continuous monitoring and evaluation

Figure 6 – The land management vision

CONCLUSIONS

Meanwhile, while LAS functions of land registration and tenure, valuation, planning and development, are the institutional core of successful economies, these functions will undergo changes as they adapt to the new policies of sustainable development, demand driven processes, acceleration in take-up of spatially enabled systems, and the historical and cultural realities. The influences are graphically described in the figure below. How a particular jurisdiction responds will depend on the understanding of the vision by its leaders. The diagrammatic presentation of a land management vision that incorporates the new land administration model (Figure 6) was developed since 2000.

The idea is that spatial enablement of land administration systems managing tenure and registration, valuation, planning and development will allow the information generated by these activities to be much more useful – in other words *iLand*. First, the achievement of sustainable development goals will be easier to evaluate. Adaptability and useability of modern spatial systems will encourage much more information to be collected and made available. The map-mashing trend following Google Earth and other major international applications shows a high public take up and popularisation of spatially enabled systems. For governments, building a suitable land policy framework will be assisted by better information chains. The services available to private and public sectors, and to community organisations should commensurably improve. Ideally these processes are dual: with modern information and communication technology, the engagement of users in design of suitable services, and the adaptability of new applications should increase and mutually influence. The global initiatives are the starting point, but in a national case, modifications to suit the particular context will be built.

The new land administration systems of the future will be local, regional and global in their capacity.

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