Implementing a Spatial Vision for Western Australia: Engaging Citizens through a Coordinated and Collaborative Approach to Spatial Information Management

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SUMMARY

The Western Australian Land Information System (WALIS) has provided a focused and collaborative culture to spatial information management across the public sector in Western Australia (WA) for more than 30 years. WALIS was formed to provide a partnership between government, industry, education and community with the sole goal of furthering the geographic information value held within the state.

Over the last few years, WA has seen a growing need by the community and industry sectors for better access to current location based information in all areas of planning and decision making. This information need is now driving a new evolution to how information is created, managed, analysed and used within the state and why a supported common location based framework is required to underpin the information value chain.

Globally we have seen that fragmented collection, poor access and use of data can undermine the inherent value of information. Government is recognised as a major generator and collector of information and the Western Australian Land Information Authority (Landgate) along with the WALIS Office is leading a Spatial Vision for WA that will see up to 80 per cent of government-owned data become spatially (location) referenced.

We know that by spatially referencing different data types of information about a particular location they can be compared or related to each other, collective understanding is possible and the power to make effective decisions significantly increase. As spatial information becomes increasingly integrated into business and society, this demand for value-added location-based data grows.

Landgate, as the lead agency for the Spatial Vision in WA is using this demand to demonstrate that an economic benefit to the State exists by improving and expanding the use, distribution and creation of publicly-funded spatial information products and services. This vision will aim to leverage current investments such as the Shared Land Information Platform (SLIP) to ensure that data across government is created and collected through better coordination, meets current and future reporting requirements and a collaborative approach to managing and maintaining data is achieved. By implementing a Spatial Vision new infrastructure development, data collection and use will no longer operate as closed systems,

in effect removing the ‘silos’ that exists today and ensuring that data is regarded as an asset to be leveraged across government and industry.

This paper will explore the Spatial Vision journey in WA and how technology is only a small component in facilitating a citizen centric, collaborative approach to information management. Building on the WALIS strategies of consultation with industry and government stakeholders will ensure the long-term strategy will service the needs of many sectors and citizens for effective development strategies of the future. Strategic planning, coordination and quality, real-time spatial information is the key.

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A Vision for the Future: the Potential Benefits of Coordinated Spatial Information Management in Western Australia

"The spatial vision for WA is about being proactive and prepared. It is about WA being a leader in a spatially enabled world"

INTRODUCTION

Spatial information is everywhere and most human activity depends on knowing where things are located and understanding how they relate to one another. A large proportion of Western Australia's (WA) economic development, social and environmental well being depends heavily upon land related activities such as mining, forestry, transport, agriculture, tourism, fisheries and the planning of community services. To facilitate the best outcomes from all of these activities, easily accessible, readily available and reliable real time spatially referenced information is critical.

Within WA, the Western Australian Land Information System (WALIS) has been communicating the benefits of information that is location (spatial) referenced for over 30 years. To realise a spatial vision for WA, the workings of WALIS will be critical to gain support across a wider range of government agencies where location information is not currently understood. The Western Australian land Information Authority (Landgate) is leading by example in creating a cultural change that will enable a collaborative approach to information management. This cultural change will aim at implementing a common information infrastructure that builds on the current spatial framework in Western Australia.

At a glance:

Information that is spatially referenced is one of the most critical elements underpinning evidence based decision-making as "**everything happens somewhere, sometime**".

Management of information spatially is increasingly being used in most sectors of the economy where it is having a direct impact on productivity, and in 2006/07, the spatial information industry contributed up to 1.2 per cent of Australia's GDP.

Realising and implementing a spatial vision is critical for WA to reach its full potential. Without a clear vision, the State will not deliver a fair return on its investment.

The longer the spatial vision is delayed, the more disparate systems will be built and the less likely the full benefits of the spatial vision will ever be realised.

A coordinated approach to the State's location information infrastructure will contribute to the overall economic, social and environmental sustainability of the State. This paper describes a hypothetical scenario as a means of demonstrating the potential benefits of investment into the development and implementation of a spatial vision for WA.

The scenario demonstrates the benefits of a coordinated approach to the management of information spatially in WA and explain how with a growing population, agriculture and land management practices could be strategically aligned to maximise efficiency and protect WA from any future global food shortages.

Within WA, strong collaboration between Departments has already been achieved via the WALIS governance framework, and improved access to spatial information has been delivered via the Government's Shared Land Information Platform (SLIP) initiative[1]. SLIP is a collaborative initiative of four leading state government agencies in WA to deliver timely, current infomation in focus areas relating to Emergency Management, Natural Resource Management, Land Interests (Interest Enquiry) and the development of an electronical Land Development Process. Currently SLIP delivers information online from 21 agencies equating to close to 400 different datasets. To maximise the benefits of this collaborative approach to managing information spatially and to assist in addressing the major challenges facing society, it is timely for the State to develop a spatial vision for WA.

A spatial vision provides an environment and an action plan to maximise the potential that spatially managed information can contribute to the economic, social and environmental development of the state. It sets the policies, establishes governance frameworks, guides technology and research and coordinates the collaborative collection, maintenance and application of information. Its inclusive approach will provide a link between government, industry and the community.

Globally, many jurisdictions are realising the value in developing a more mature, coordinated and policy orientated approach to managing data spatially. WA is building on the strong collaborative framework that SLIP and WALIS have achieved to develop a spatial vision that will ensure State developments are progressed in a timely, resource-effective and meaningful way, while considering the changing needs of citizens. With a clear vision, the State will deliver a fair return on its investment and support the growing spatial industry. Coordination and direction of a spatial vision for the state will require leadership to ensure that the spatial information endeavours for WA are met.

WA has a reputation as a world-leader in collaborative initiatives for improving the use of spatial information and is uniquely positioned to exploit this situation further. The development of the SLIP Enabling Platform is evidence in leading in collaborative initiatives. Development of a whole-of-government vision now will maximise the benefits through its contribution to the planning and implementation of major developments in WA such as the Gorgon, Oakajee and the Ord Phase 2 projects.

[1] Shared Land Information Platform: https://www2.landgate.wa.gov.au/slip/portal/about/about.html

BACKGROUND

Spatial information describes the location and identity of objects in the real world and the relationships between them. It is one of the most critical elements underpinning decision-making because "everything happens somewhere, sometime"[2]. Government is the major generator and collector of information and around 80 per cent of government owned data can be spatially referenced[3]. Information collected can be referenced to a location via an address, names of features, latitude/longitude and boundaries beneath, on, or above the surface of the earth. It includes natural or built features, and is usually stored as coordinates that can be graphically represented, as shown in Figure 1.

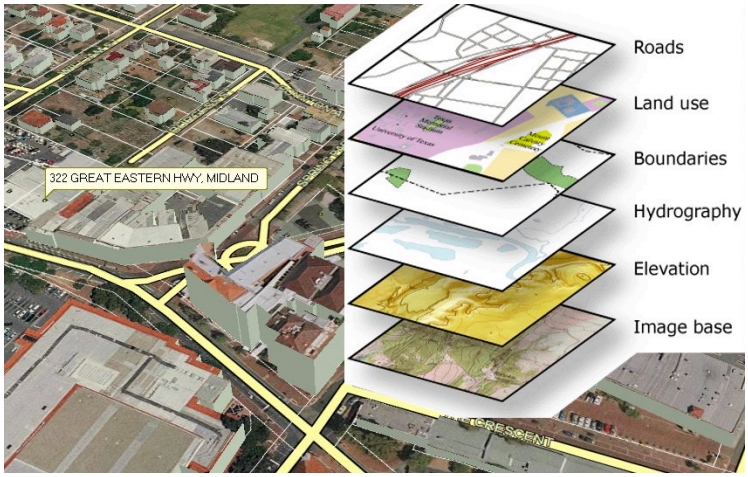

Figure 1. Spatially referenced information integrated and graphically represented.

As spatial information becomes increasingly integrated into business and society, the demand for value-added location-based data grows[4]. Gartner (a world-wide information technology research and advisory company) estimates that the number of consumer location-based service subscribers globally will grow from 41 million in 2008 to 95 million in 2009. This number will exceed 836 million in 2013. Revenue from user spend on location-based services is expected to increase from US$998.3 million in 2008 to US$2.2 billion in 2009 and will exceed US$12.6 billion in 2013[5].

[2] Geographic Information Panel (2008). *Place matters: The location strategy for the United Kingdom*. Department for Communities and Local Government. Accessed July 20, 2009, from http://www.communities.gov.uk/

[3] Economic Development and Infrastructure Committee (2009*). Inquiry into improving access to Victorian public sector information and data.* Parliament of Victoria. Accessed August 4, 2009, from http://www.parliament.vic.gov.au/

[4] Australian Spatial Information Business Association (2008). *Australian spatial data infrastructure: A submission to Infrastructure Australia.* CRC for Spatial Information. Accessed August 1, 2009, from http://www.asiba.com.au/

[5] Gartner Inc (2009). *Dataquest insight: Consumer location-based services, subscribers and revenue forecast, 2007-2013*. Accessed September 3, 2009, from http://www.gartner.com/

In Australia alone, the spatial information industry contributed to a cumulative gain of between $6.4 billion and $12.5 billion in gross domestic product (GDP) in 2006/07, which is equivalent to 0.6 per cent and 1.2 per cent of GDP respectively[6].

As an acknowledged priority for Government, the effective policy setting and cross government collaboration for spatial information will ensure that the Government reaps greater and earlier productivity improvements. WA has the opportunity to maximise benefits with well coordinated spatial information.

These improvements to information management through a spatial framework will maximise the creation, distribution and use of public sector information; create an innovative, strong and value-added spatial information industry; maintain a highly skilled and creative workforce; and leverage investment in spatial information and systems for economic, social and environmental sustainability.

As an example of lessons learned, the SLIP initiative highlighted that 80% of the information identified for each of the focus areas in SLIP was consistent across each focus area. As SLIP provided access to the source of truth for data, the duplication of replicating data stores for each focus area was minimised and savings in infrastructure and resources could be utilised in other areas. The figure represented below shows an overview of how the SLIP Enabling infrastructure is providing a federated model for information access. Each contributing data custodian retains control on how their data is accessed and portrayed while the users of the system are ensured that information is being accessed in a timely and trustworthy manner.

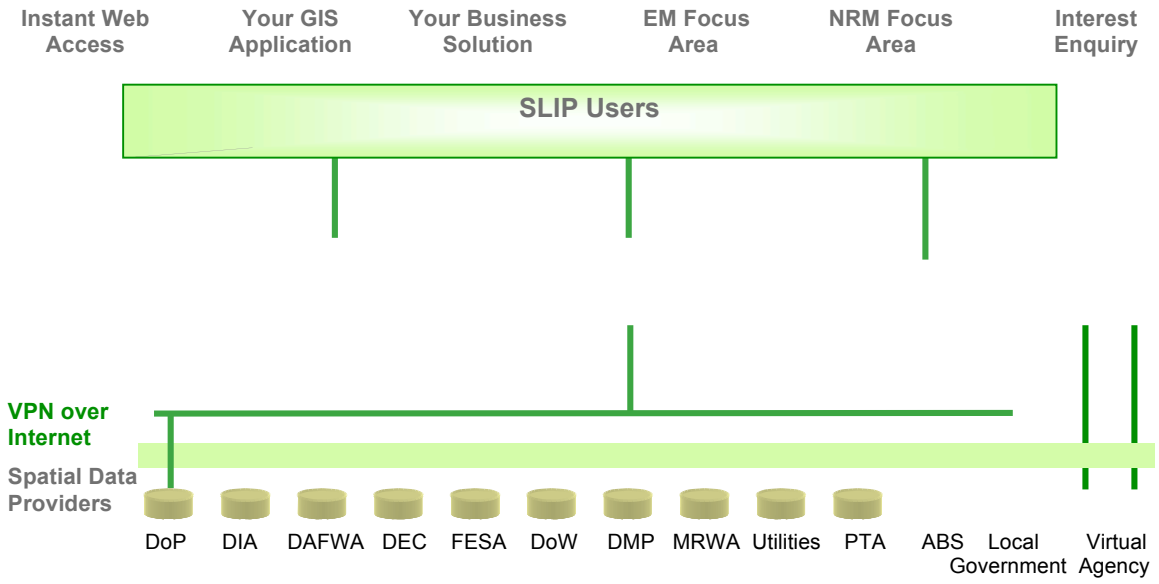

Figure 2. The SLIP Enabling Framework – a federated model for information management.

[6] ACIL Tasman (2008). *The value of spatial information*. Cooperative Research Centre for Spatial Information. Accessed August 5, 2009, from http://www.crcsi.com.au/

To achieve savings and increase the net worth of data that is spatially referenced, all stakeholders need to recognise and share their common visions and develop common goals and action plans. The strategies to achieve this vision will focus on coordinating data collection ("collect once, use many times"), facilitating standards, discovery and access to data (e.g. SLIP), enabling applications and proliferation of the benefits. The vision is about being proactive and prepared. It is about WA being a leader in a spatially enabled world.

WA'S APPROACH TO DEVELOPING A SPATIAL VISION

Building the collaborative culture required to develop and implement a spatial vision for WA requires significant investment in resources and importantly human time. Landgate and WALIS are leading this initiative for WA which focuses on a number of important areas:

Engage and educate – raising awareness across the agency, throughout the spatial industry and the WALIS community, across government, academia, professional bodies and the citizens of WA.

- Explaining the value of "spatial information", demystifying spatial for people outside the spatial community and demonstrating the benefits;
- Gaining stakeholders support for the project, through extensive consultation and engagement.

Collaboration with all stakeholders that will ensure uptake is achieved through a consultative lead where bureaucratic processes are not 'forced' onto stakeholders. Working together across all stakeholder groups will ensure the current 'silos' of information collection, management and technology investments is coordinated so that WA's information asset becomes a reality. Much of the collaboration identified as needed for a spatial vision is a direct outcome of the lessons learned and infrastructure development process of the SLIP initiative. The collaborative approach will provide:

- The means of demonstrating the outcomes and benefits for all groups;
- Inspired action amongst the stakeholder groups;
- Identification and use of champions to help drive the project; from within Landgate, the WALIS office, political champions, thought leaders and from within the spatial community;
- A **spatial information strategy**, an actual "plan" for managing WA's information spatially
- Ministerial endorsement for the vision and strategy and official launch across the State.

It is important to note that the spatial vision is not about generating specific action plans that can be linked to stakeholder staff members, or which agency will undertake particular tasks or technical details (software, hardware, infrastructure for a "spatially enabled WA"). This

vision is a framework that can be used to build the capacity that WA needs to develop into the future.

ELEMENTS OF A SPATIAL VISION

In developing a spatial vision for WA the effort required and the message of Why, How, What and So What needs to be clearly articulated so that the vision is embraced and promoted by all stakeholders. By providing focus within the vision the elements of the spatial vision can be articulated in a common understanding.

The Why

- Objectives – provide several perspective outcomes relating to Landgate, Government, Industry, Community.
- Benefits – better information, cohesion, collection mechanisms, access to more quality information > better decision-making for prioritisation and planning > more targeted services > efficiencies > community participation.

The How

- Guiding principles – underpin everything we do and guide decision making and resource management.
- Governance – leadership, participation, policy, outlining roles and responsibilities.
- Education and awareness – increasing understanding across government and within the WALIS community of the importance and benefits of location information.
- Engagement – communication, consultation, and branding is critical in promoting a spatial vision for WA at a level that is understood by all.
- Reporting and monitoring – focus on consistency, progressing the vision, maintaining momentum.

The What (detailed at a conceptual level within the vision)

- Data management guidelines– collecting quality data, capture, preservation, access, capacity planning (e.g. digital storage)
- Technology– systems, software, hardware, infrastructure.
- Interoperability – standards (systems, services, data), best practice.

So What

- Work program – Landgate's implementation plan for the spatial vision and what other agencies will be doing – and delivering the outcomes and minimising duplication.
- Realising the vision is the actual deliverables – for Landgate and for the State: specific initiatives/programs that could be noted in the vision at a very high level.

The figure represented below highlights the importance and effort request at each stage in implementing a spatial vision for WA. As the vision progresses the lighter colours represent lower effort and focus compared to the earlier phase of developing a spatial vision.

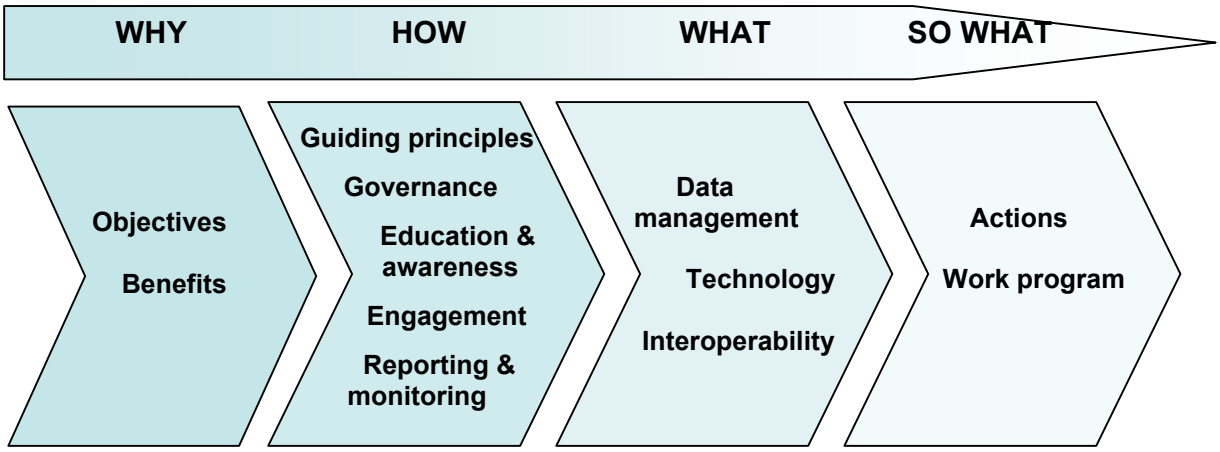

Figure 3. Elements of the Spatial Vision for WA that will be developed in consultation with stakeholders

POTENTIAL 'FUTURE' EXAMPLE OF THE BENEFITS OF A SPATIAL VISION

The following scenario of a newspaper "headline from the future" provides a hypothetical, yet plausible, example of what is achievable from a collaborative approach to spatially referenced information management in WA.

At the centre of this example is a theoretical 'digital workbench' that builds on the SLIP infrastructure and provides the means to source and access all of the necessary information, as well as to display, test, model and predict development, social and environmental outcomes.

The digital workbench enables optimal decision-making through the availability of a complex mix of real-world data about the environment, economy, demography, technology and other areas, as well as a simulated future. While the digital workbench does not yet exist, the technology and precursors to its development do, and it is a real possibility if there is adequate commitment to the use and value-adding of information to include a location reference (spatial).

HEADLINE:
MARCH 2016 – ORD FOOD BOWL OF THE NORTH

A recent report into the growing global food shortage has estimated that many developed countries will not be able to feed their citizens by 2050.

WA is well placed to withstand the pressures of the global food crisis and is ideally placed to take advantage of export opportunities as a result of efficient land management practices and an effort to collect and share knowledge across the State's agricultural regions.

In WA, precision agriculture and yield management practices are now embedded into agriculture throughout the State resulting in improvements in excess of 40 per cent in productivity and input costs have been minimised. These capabilities are based on the infrastructure of a vast network of real-time positioning stations providing accurate information for local GPS receivers and a coordinated data capture program. The investment by the State Government in a planned spatial vision, set out in 2010, has enabled maximum efficiency out of agricultural regions like the Ord, by using machine guidance, robotic operations, data and land management optimisation.

Background to the Scenario

The future of WA's food supply needs an organised and focused strategic plan. Some projects are currently underway, such as that initiated by the Australian Government through the Grains Research and Development Corporation in 2009 to look at the adoption of GPS for reducing input costs and yield mapping and to understand what affects this has on the farming community[7].
The agriculture farming industry in WA will need to leverage the value of collective information to remain competitive. A focused spatial vision for State information could see this industry undergo important and considerable change.

How improved spatial information management could address the problem

In this scenario, some of the specific benefits of an expanded SLIP include delivering:

- 2cm precision location information to GPS devices in farming machinery, combined with precision terrain mapping, making remote, automatic operation of machinery possible;
- satellite imagery to assess crop growth, determine fertiliser and water requirements and predict the yield resulting in decreased costs and increased productivity;
- integrated, spatially referenced information from across government agencies such as soil type and structure, meteorological data, fire activity and local environmental factors that relate to the farmers' ability to maximise production; and
- a whole-of-government tool for addressing key priority issues including the environment and climate change.

[7]Grain Research and Development Corporation (2008). *Putting precision agriculture on the ground in Western Australia*. The agriculture farming industry in WA has undergone considerable change in the last 10 years due to the focused Spatial Vision for State information. Accessed August 30, 2009, from http://www.grdc.com.au/

This example of an outcome focussed government reform demonstrates that a coordinated approach to the management of spatial information would build capabilities and provide the following benefits to government and the community:

Capabilities	Benefits
• access, use and integrate information from a number of agencies in real-time and with precision accuracy	• support business growth and development
• partner with industry and the community	• build and share knowledge
• visually depict information in 2, 3 and 4 dimensions	• modelling and predictive analysis for short, medium and long-term solutions

The building of these capabilities in a partnership between government and industry will contribute to a number of reform areas:

- supporting business growth and productivity;
- increasing sustainability; and
- citizen-centric policy and decision-making.

SLIP will position itself within the spatial vision for WA to be expanded to deliver analysis, reporting and predictive modelling tools for use by government agencies, research and education institutions, industry and the community. These value-adding tools, combined with comprehensive, real-time government information would underpin an innovative public sector and a knowledge-based economy.

WHAT A SPATIAL VISION ENABLES

Building on the elements listed earlier in what a spatial vision for WA would contain, the vision would be developed in consultation with industry and government stakeholders to ensure a long-term strategy to service the needs of government, the industry and the community.

The approach to developing the spatial vision for WA will require Landgate to engage with key stakeholder groups (including WALIS, community, State and Local Government agencies, Spatial Industries Business Association (SIBA), the Surveying and Spatial Sciences institute (SSSI) and land related professional groups) to develop the spatial vision for the State and proposes to take a leadership role in the implementation of the vision across government, industry and the community.

This is a multi-faceted approach involving:

- **Creating the environment** that supports and builds the spatial information capability of the State through setting policies, establishing governance frameworks, guiding technology and research and coordinating the collaborative collection, maintenance and application of spatial information. For example, continuing the work currently being undertaken by Landgate with the Department of Planning on the Electronic Land Development Process (eLDP) to provide the technological enabler for reform of planning approvals processes.

- **Promoting** the potential that spatial information can contribute to the economic, social and environmental development of the State through:

- **Spatially referencing information** to assist in monitoring and modelling potential risks and sustainable development, effective management of resources, exploration and decision-making for environment and land management issues. For instance, the ability to easily access and retrieve past development proposals and research studies relating to a particular location increases collective knowledge while reducing duplication of effort and costs;

- **Effectively** using digital map information regarding the location and impact of actual and predicted incidents to reduce response times and optimise resource allocation in emergency services and disaster management. The use of FireWatch[8] for both incident management and resource deployment, while facilitating the development of long term land management policy, demonstrates this ability;

- **Supporting** the combining of the full range of human services information, spatially depicting and value-adding with analysis and predictive tools for improved service delivery, evidence based policies and effective deployment of resources. The ability to

[8] A national fire monitoring and reporting system developed by Landgate utilising remotely sensed information

access the Australian Bureau of Statistic's census data through SLIP allows for multi-sector and demographic analysis by location;

- **Integrating spatially referenced data** to enable seamless, end-to-end transactions across multiple agencies, the fast tracking of approvals and a single payment facility to expedite development state-wide; and

- **Building a shared knowledge** of the Government's assets contributing to optimal use across government, such as the ability to visually depict property-ownership and securely display value, residential density, proximity to amenities and development potential.

- **Linking government,** industry and the community through incorporating two-way communication options, promoting citizen-centric policies and enhancing community engagement. For instance, the SLIP Developers program where industry is working with Landgate to develop applications to expand the usefulness of SLIP into all areas of government and the community at large.

The elements of the developed spatial vision for WA will aim to leverage existing investments such as the SLIP platform. By expanding SLIP, added components within the data value chain can be coordinated through this common platform to realise the goals of a spatial vision for WA.

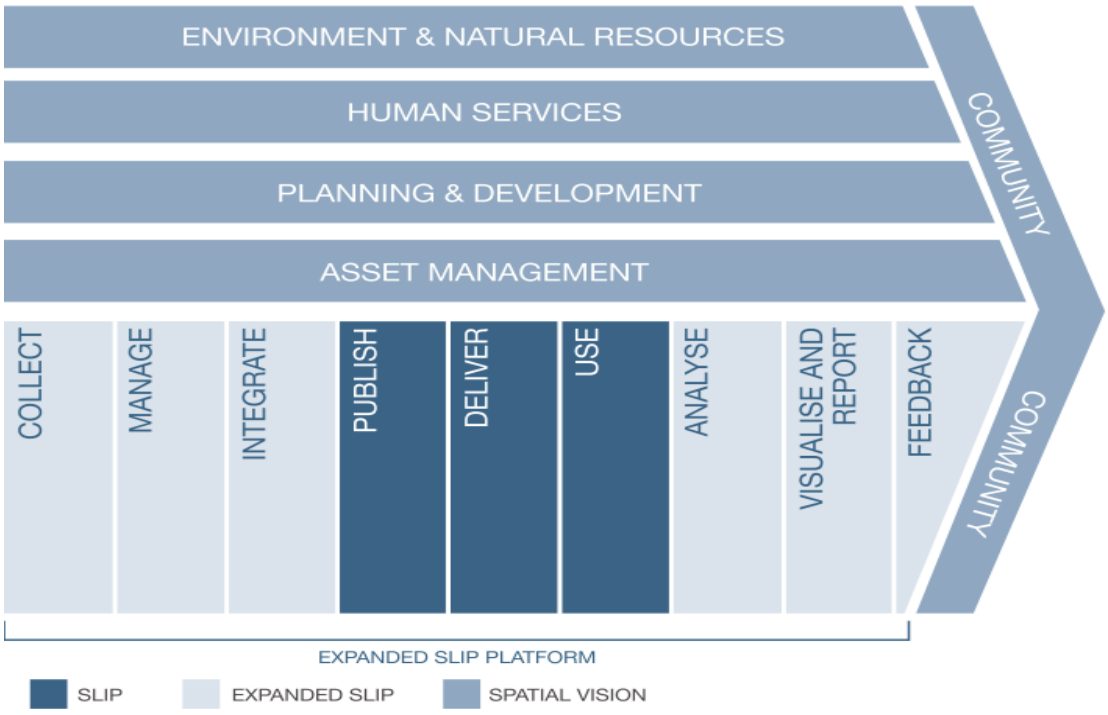

Figure 4: Data Value Chain detailing components of a Spatial Vision for WA

By implementing and ensuring data becomes a valued asset accross government, the expected outcomes that will be delivered for WA (including government, industry and the community) can be detailed as follows:

- better decision making, planning and impact assessment;
- reduced costs through less duplication and increased efficiencies;
- improved accessibility and availability of critical information;
- developing the spatial industry to provide opportunities for growth and innovation;
- value-adding to data to provide a wider range of relevant services; and
- citizen-centric approach delivering better targeted services.

CHALLENGES

Fragmented collection and the poor access and use of data are undermining the inherent value of spatial information. To increase the net economic benefit by maximising the use, distribution and creation of spatial information products and services, the sharing of data and information systems across government must improve.

The information generated and held by the public sector has the potential to be used for economic, social and environmental benefit. The recognition of the value of information through appropriate pricing regimes results in customer driven products and services and the necessary investment in areas that customer's value. The concept of information as an asset is key and the increased use of spatially referenced government information will generate a greater return to taxpayers through industry growth and the uptake of location-based technologies by the business community.

Different systems and standards are already employed across agencies. As existing technology is due to be upgraded, a mechanism is required to coordinate initiatives at the State level. The existing ad-hoc approach limits the use of common technologies, interoperability, streamlined system implementation and more targeted services. The longer the spatial vision is delayed, the more disparate systems will be in place and the less likely the full benefits of the vision will ever be realised. The current SLIP program provides a good model for increasing capacity, and delivering more integrated and value-added state-owned information that can be expanded out across the state and further with minimal investment.

Recognising that spatial information is a means to an end, rather then an end in itself is critical to this evolution. The attraction and retention of the right people with the right skills, now and in the future, represents an enormous challenge for government. Expertise needs to move from a limited core of specialists into mainstream policy development and service delivery[9].

[9] Geographic Information Panel (2008). *Place matters: The location strategy for the United Kingdom*. Department for Communities and Local Government. Accessed July 20, 2009, from http://www.communities.gov.uk/publications/communities

GUIDING PRINCIPLES

In developing the spatial vision for WA it is critical that a set of common principles are to be established that underpin all planning, decision making and resource management. These guiding priciples will include concepts such as:

- Information is a valuable asset to be made readily available in a format that is sustainable and can be leveraged for the benefit of the WA economy, community and environment.
- Data is collected once, used many times and kept where it can be maintained most effectively.
- Data is "fit for purpose" and meets the needs of end users.
- Spatial information from numerous sources is seamlessly combined and shared via technical solutions that can be re-used and that encourage accessibility and availability for multiple users and uses.
- It is easy to find what spatial information is available, how it can be used to meet a particular need and under which conditions it can be acquired and utilised.
- Privacy considerations and data custodianship are taken into account.

CONCLUDING COMMENTS

Landgate possesses the capabilities to take on a leadership role in the development of a spatial vision for WA. Through past experiences, the agency has demonstrated its ability to deliver complex multi-agency projects that improve cross-government collaboration and efficiency, such as SLIP. It has proven its flexibility and innovative capacity to respond to changing stakeholder and has embraced technology and focused on long-term objectives in providing services that have helped mature the spatial information sector in WA. In doing this, Landgate has established networks across the global spatial industry and contributes to the national spatial agenda, collaborating with key research and industry bodies.

Realising and implementing a spatial vision is essential for WA to reach its potential. The economic, social and environmental prosperity and sustainability of WA demands "world's best practice" strategic planning and coordination – quality, real-time spatial information is the foundation.

In closing:

A spatial vision will cohesively link disparate data sources (including social, environmental and registration) to enable improved growth, planning and development for the future prosperity of the State.

In addition to recognising the value of information, a collaborative and consultative approach is needed across the public sector for a complete and achievable vision.

Landgate's role in developing the spatial vision will ensure that:

- all current and future interests are considered; and
- economic benefit to the State is maximised.

CONTACTS

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