Re-engineering SDI Development to Support a Spatially Enabled Society

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1 Introduction
The development of SDIs has continuously evolved and changed since their creation in the 1990’s, originally to enhance the ability to share spatial data. There is now the need to link and deliver a greater range of services and information to users across national, state and local jurisdictions, organisations and disciplines in order to support a spatially enabled society. The concept of a Virtual Australia, development of online players such as Google Earth and the increased need for integrated data and services is creating the need for the Australian SDI to be re-engineered to be able to meet this new challenge.

2 Role of government, academia and the private sector
SDIs were originally created with the primary goal to share spatial data. They were lead by governments through policy creation and infrastructure building mainly at the national level. This was driven primarily through national mapping and spatial data activities to meet national planning and management needs. The major objectives of these original SDI initiatives, as summarized by Masser (1998) were to promote economic development, to stimulate better government and to foster environmental sustainability. The focus was on the creation and collection of data. The national governments played both a strategic and operational role in SDI development through a top-down policy approach. The involvement of sub-national governments and the private sector was not as well developed or coordinated.

![Figure 1. Role of national government, sub-national government and the private sector in early SDI development](image)

From around 2000, countries began updating their SDI development strategies. This shift was brought about due to the opportunities brought about by the development of the Internet and World Wide Web, creating a much more user oriented SDI focus. The focus of SDIs moved to the creation of an infrastructure to facilitate the management of information assets instead of the linkage to existing and future databases (Rajabifard et al. 2006a). This has seen the emergence of sub-national governments in the development of SDIs, as it is these governments which tend to control the large-scale, people relevant data (such as cadastral data) that requires an infrastructure to help maintain and update such data. It is also at this level that large scale land administration data is produced, which aids in collecting land taxes, land use planning, the operation of land markets, road and infrastructure development and day-to-day decision making.
The private sector is also beginning to play a much larger role in the operational aspect of SDI development. The previous influence of national governments at both a strategic and operational level has diminished, although there is still a strong case for a strategic national government role in SDI development (Rajabifard, et al. 2006a).

SDI is now playing a much broader role in modern society, with the concept continuing to evolve. SDIs are now moving to underpin an information society and enable society to become spatially enabled, and this change brings with it challenges, including funding SDI development, inclusion of the marine and coastal environment in SDI development, and the creation of an enabling platform for wider use of spatial information.

3 Funding

The development of SDIs is a long term process, with support from governments at all levels extremely important. The length of time it takes to implement an SDI brings with it many challenges, including the need to sustain funding. There is now a need within Australia to create a new funding model that will motivate all potential contributors and ensure that the Australian SDI develops in an interoperable fashion, without supporting only certain segments of the community.

Governments have traditionally used a fee or cost-recovery policy for data that is produced and distributed through SDIs. It could be argued that this process actually may stall or hinder the development of an Australia wide SDI through a reduction in the use of such fundamental datasets by the broader spatial information community. There is now the need to develop funding models that are not tied to particular data, but could perhaps be linked to industry action. Governments could make funding available for specific SDI development opportunities which are linked to in-kind contributions from industry. This way, the SDI continues to develop in partnership between Government and industry, lessening the burden on governments to create the Australian SDI. This is especially relevant to funding at a National level, with the State based governments currently funding the majority of SDI development activities.

This type of new funding model will also help to stimulate activity within the private sector along the lines of SDI development. Governments need to find new ways in which to engage the community and industry, in order to leverage off funds available.
4 Marine/Coastal SDI development

The development of SDIs has occurred mainly within the terrestrial environment, with any development in the marine environment generally occurring outside of national SDI initiatives. Administering the spatial dimension of the marine environment however is important to society, as decision-makers in both land and marine areas of the coastal zone need to access marine related datasets in order to effectively achieve their economic, social and environmental objectives. Historically, the marine environment has been managed differently to the terrestrial environment through sectoral planning, with government fisheries agencies managing fisheries and historical shipwrecks managed by a separate government agency for example. Jurisdictional limits and marine boundaries are multiple and often unclear. There is generally no single agency managing offshore rights, restrictions and responsibilities, and the mapping of legal boundaries is difficult due to the three-dimensional (and often four-dimensional) aspect and lack of physical reference. Added to this, information needed to effectively manage the marine environment is stored within silos, with no interconnection between relevant information streams (Binns et al. 2005).

While many countries are developing SDIs to improve access and sharing of spatial data, most of these initiatives stop at the coastline. The need for access to spatial data for improved decision-making and management however, does not. Therefore, there is a need to develop a seamless SDI that can include data from the land, coastal zone and marine environments which will improve access and sharing of data between these environments. With this in mind, the importance of understanding the link between land and marine environments (they cannot be treated in isolation) and the need for cooperation between nations as maritime actions transcend national boundaries is a major issue as highlighted by Rajabifard et al. (2005) and illustrated in Figure 3.

5 Enabling platform

In order to bring diversified services and functions together and achieve a spatially enabled society, there is a need to facilitate data integration and interoperability through SDI development through a focus on service creation, rather than the traditional data focus (Spatial Information Infrastructure). For this to occur, an enabling platform needs to be developed and established that will facilitate the provision of the place or where or location to all human activities, government actions, decisions and policies. This will allow business transactions to be linked to a place or location and further allows that place or location to facilitate the evaluation and analysis of relationships between people, business transactions and government. For this to occur however, the role of the traditional SDI needs to be re-engineered (Radwan et al. 2005). There is a need for
a service-oriented infrastructure in which citizens and organisations can rely for the provision of required services. Current understanding of SDIs has seen the development of SDI models that have not met user needs as expected, currently providing mainly an ability to access and retrieve spatial data. Hence the concept of an SDI needs to progress so that it allows more than just the ability to access spatial information. It needs to become an entity that is enhanced so that it is possible to share data, business goals, strategies, processes, operations and value-added products and services in order to support a spatially enabled government (Williamson et al. 2006).

This builds on the concept of a virtual jurisdiction, which aims to support a knowledge base to provide a major point of discovery and communication to complete, correct and current information about the environment and related spatial information applications. This concept will also not only provide access to information and applications, but take into account related legal, privacy and intellectual property issues associated with the data itself, aspects which are often overlooked. This will help to create a more inclusive mechanism for data access and use across jurisdictions and help in managing the changing role of governments, the private sector and academia in SDI development (Rajabifard et al. 2006b).

6 Conclusion

The development of SDIs is an on-going process, in Australia and internationally. The original development of an SDI as a spatial data access mechanism has changed to that of the delivery of diversified services and functions. This change is being delivered through the creation of an enabling platform in order to spatially enable government and society at all levels. For this to be realised however, work still needs to be done in order to overcome various challenges and issues including:

- the development of more effective funding mechanisms for SDI development, especially those that create opportunities for the private sector to aid in developing SDIs;
- the need for clearly defined roles for SDI development across all government sectors, academia and the private sector;
- the inclusion of the marine and coastal environments in SDI development; and
- creation of an enabling platform for the delivery of a greater range of services and functions.

Overcoming these challenges will help to ensure that the development of SDIs meet the future needs of a spatially enabled government and society.

7 References


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Biographical notes

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