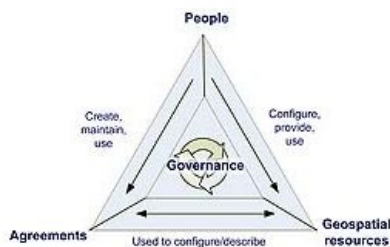
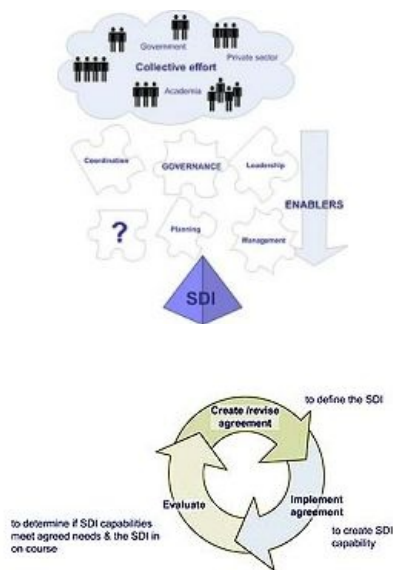


# KEY CONCEPTS IN SPATIAL DATA INFRASTRUCTURE

## SDI Governance: to Steer or Row



Spatial Data Infrastructure (SDI) is a framework of policies, standards and technology that enables data providers to publish, and users to access and integrate, distributed heterogeneous geospatial information. Despite recognition of the important role played by SDI governance, its scope and overall role in enabling an SDI remain unclear. Each SDI initiative must thus independently

tackle the same set of challenges. This results in duplicative and inconsistent approaches that hamper prospects for attaining interoperability, inter-SDI leveraging and reuse of governance resources.

Governance is a 'steering' function, providing leadership and an enabling framework for collective decision making. However, as applied to SDI, governance has become shorthand for the institutional arrangements that enable SDI, and therefore includes functions such as co-ordination and management. These 'rowing' functions extend the scope of governance to include decision implementation. But the question arises, as depicted in Figure 1, are these really governance functions, and if not, what is their relationship to governance? The notion of governance is an old one, derived from ancient

Greek and meaning to steer or pilot a ship. Today it is a key concept in a number of disciplines, but has different and often contested definitions. Before exploring SDI governance, a brief overview of its meaning in the context of political science, organisations and IT is necessary.

### Government Function

Governance was originally considered to be a function of government, representing the exercise of political, economic and administrative authority in managing national affairs. Changing socio-political and technological realities, including the diminishing role of national government (due to globalisation and privatisation) and the increased role of other societal stakeholders, have resulted in broader definitions of the term. These reflect the increased role of non-state actors in service provision and the aspirations of society to be inclusive in its own decision-making. Self-organising policy networks are consequently currently recognised as important mechanisms of governance.

Governance is an important concept in business and public administration. In the seventeenth century, when companies developed a legal identity separate from their owners, it became necessary to create mechanisms to ensure that company behaviour was aligned with the interests of owners: governance was born. Governance functions within organisations typically include setting strategic goals, supervising management and monitoring results.

### IT Governance

Given the need for increased accountability, the rapid pace of technological change in business environments and the crucial role of IT in achieving business strategies, IT governance has become an increasingly important discipline with a wide range of tools, methods and approaches. At one end of the spectrum IT governance may be conceived as the organisational structures, processes and leadership that ensure IT supports organisational objectives. At the opposite end, IT governance can be viewed as a framework for assigning IT decision-

making rights within organisations.

Service-oriented architecture (SOA) is a much-hyped new technology paradigm that is being widely adopted for SDI implementation. It is an approach to dealing with heterogeneous IT assets under the control of different owners. SOA is about services: modular, interoperable chunks of functionality designed to meet specific business purposes and capable of being reused and combined in various ways to meet changing needs. However, SOA adoption requires radical changes in the way IT resources are developed and managed. The interdependence of services and numbers of people and roles involved in the design, operation and use of services implies the need for strong governance.

### **Duplicated Effort**

As may already be seen, governance can be interpreted in very different ways. This combined with a lack of common understanding of the overall role of governance in enabling an SDI, results in ad hoc approaches to addressing governance challenges. Lack of a common approach means that each SDI must independently solve governance challenges, duplicative effort that leads to incompatible approaches to governance which ultimately diminish the prospects for reuse of data or building dependencies between SDIs.

### **Cyclical Process**

SDIs are collaborative, multi-stakeholder initiatives created around agreements covering virtually every aspect of the SDI. As depicted in Figure 2, governance plays a central role in SDI by enabling the creation of agreements that bind together the people and geospatial resources (data and technology) involved. A range of other functions is, however, necessary to channel collective efforts towards common goals. If these are not elements of governance, what is their relationship? A broader view of SDI governance is that of a framework enabling stakeholders to make and implement decisions and evaluate community efforts towards the realisation of agreed common goals, thus keeping the initiative on track. This view of SDI governance as a cyclical process is shown in Figure 3.

The creation of agreements and their periodic review, ensuring that they continue to achieve desired outcomes, is the first step in the process. The governance of technical agreements such as standards, specifications and application schema, is one of the major challenges of SDI governance. Technical agreements are used to define how SDI capabilities (primarily data delivered via technology-supported services) are configured. Capabilities are developed, owned and operated by individual organisations, in accordance with agreements, to meet agreed community needs.

### **Geo-custody**

Key to the operation of an SDI is the relationship between governance (in the collective realm) and the management and operation of SDI capabilities (within individual organisations). This relationship is encapsulated in the notion of custody of geospatial information. Custody represents an assigned and accepted responsibility for an organisation to collect, manage and provide access to geospatial resources, effectively holding the resources in trust for the community.

However, in order to act as custodian the organisation requires approval at management and possibly governance level. If geospatial resources are being delivered via services such as web services, approval and operational support from IT governance within the organisation will also be required. However, there are several potential barriers to such approbation being won. These may arise as a result of organisational culture, policy or business model with regard to information sharing. In addition, given the newness of SOA and the risks and costs associated with its adoption, investments may be hard to justify, particularly when benefits accrue to those outside the organisation.

In many instances an organisation's geospatial IT resources are treated as a special case in terms of IT resources, and do not come fully under IT governance. This common intra-organisational separation between geospatial business units and IT governance may present a significant obstacle to it acting as custodian.

### **Co-ordination**

SDIs are not monolithic systems, but complex evolving interconnected networks, so that traditional management approaches based on the ability to command, control and resource activities are not appropriate. In fact, it has been argued that SDI leadership is actually the antithesis of good management practice.

SDI capability evolves over time from an installed basis of pre-existing technology and users, typically through multiple projects and activities, all independently owned, resourced and managed. The separate projects and activities that develop and operate SDI capabilities need to be co-ordinated, particularly if they contribute key capabilities upon which other capabilities or users rely. The task of co-ordinating SDI capabilities under fragmented management presents a significant challenge. Although the co-ordination and management of specific elements of the SDI can be delegated to individual agencies, these functions are a collective responsibility and should have clearly defined relationships to governance.

## Agreement Artefacts

Operation of the framework of governance also requires co-ordination and management. A key dimension of this is management of agreement artefacts such as business cases, policies, specifications and application schemas reflecting community consensus concerning SDI goals and the means for achieving them. These artefacts, particularly those describing technical agreements, must be managed throughout their lifecycles (from creation through revision to retirement) to ensure they can be discovered and used in the support of configuration and publication of new data and services. Agreements also provide a valuable description of published geospatial resources, accessed to obtain deeper technical understanding of resources. Consistent approaches to the configuration of technical agreements open up the possibility of inter-community reuse, thus leveraging the knowledge embodied in them.

## Steering a Flotilla

SDI governance can be likened to steering a flotilla of ships representing institutionally independent but functionally interdependent capabilities. To keep both individual vessels and the entire flotilla on course it is necessary to provide an unambiguous definition of the collective and individual responsibilities for decision making, implementation and evaluation, together with the mechanisms that enable these. The present authors are researching SDI governance with a view to meeting this need. The aim of the research is to develop a model of SDI governance that draws on broad, multidisciplinary research together with analysis of Australian SDI case-studies.

## Further Reading

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