BUILDING SDI IN AFRICA: A SOUTH AFRICAN EXPERIENCE

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1. Introduction

A co-ordinated approach to building SDI is motivated both by the fact that it is cost-effective, as well as necessary to ensure that information from diverse sources can be integrated readily and meaningfully. The need for cost-effectiveness is all the more pressing where resources are limited. However, in Africa, to date relatively few formal national programmes have been initiated to build SDI in a coherent way, and efforts to build supporting structures to nurture and foster SDI in the continent as a whole are at an early stage.

South Africa is one of the African countries which has committed resources to the co-ordination of SDI building activities, and the experience of building SDI in South Africa is presented below. It might be thought that the South African experience may not be all that representative of the African context, considering its far better than average (for the continent) telecommunication infrastructure and close to the highest GDP per capita in Africa. However, in a questionnaire probing projects and programmes contributing to the creation of SDI, challenges highlighted by respondents from across the continent did not differ qualitatively from those experienced in South Africa *(Harlan Onsrud, "Survey of National and Regional SDI Activities around the globe",* http://www.spatial.main.edu/~onsrud/GSDI.htm). Further, in common with many other countries in Africa, organizations with nation-wide jurisdictions have to date been the dominant players with respect to spatial data capturing, management and distribution.

In pursuing SDI development, South Africa has been keenly aware of the need to be take cognizance of and indeed participate in initiatives involving neighbouring countries, as well as those operating at a continental scale. An overview of several efforts to co-ordinate SDI development within Africa as a whole is provided, before presenting some challenges facing the building of SDI in Africa.

2. South Africa's National Spatial Information Framework

2.1 Background and context

In 1997, the national Department of Land Affairs (DLA) dedicated resources to establishing and developing the National Spatial Information Framework (NSIF), South Africa's Spatial Data Infrastructure (SDI) initiative. This replaced a project know as the "National Land Information System" (NLIS) which operated in the late 1980s/early 1990s, which, due to inadequate dedicated resources, had been unable to achieve the hoped for co-ordination with respect to spatial information gathering.

Recognition of the need for the co-ordination of resources going into collecting and managing spatial information has, since 1994, been paralleled by a concern regarding the co-ordination of the location of investment by different sectors and spheres of government (national, provincial, local), i.e the need for a national spatial planning framework, also seen as the responsibility of DLA. The need for spatial planning, particularly at the local level, has been strongly emphasised since 1994 (*For a review of spatial planning practices and relevant legislation, refer to "The Green Paper on Development and Planning", Development and Planning Commission,1999).* Clearly, for a working spatial planning system, spatial information must be available, together with the means to assemble and manipulate it. It is not surprising then, that the staffing component developing the NSIF has been amalgamated with the component responsible for spatial planning within DLA, into a component known as "Spatial Planning and Information".

2.2 Achievements and lessons learnt

Drawing on models and experience in building SDI elsewhere, NSIF activity has focussed on improving access to spatial data, identifying "framework" data sets, developing standards for geographic information to enable its sharing and integration and the framing of policy with regard to spatial information management and institutional arrangements. Significant effort has also gone into building a culture of information sharing and co-operation and promoting the participation of all sectors of the geographic information community in developing the NSIF.

2.2.1 Improving access to spatial data

A metadata database (the Spatial Data Discovery Facility, or SDDF) is available through the internet. The SDDF contains around 3000 records on spatial data holdings within both public and private sectors and is searchable through a variety of different interfaces (*see* http://www.nsif.org.za , *go to "SDDF"*). The map interface used includes the identified framework data sets, in order to promote the use of certain standard, base datasets. In itself, it provides viewing access to key spatial data sets, which may in fact be sufficient to meet the less sophisticated "where is…?" need for spatial information, without enlisting the help of someone with GIS expertise to obtain access to spatial data sets.

The SDDF also provides information on datasets covering the Southern African Development Community (SADC) region, achieved through co-operation with the Regional Remote Sensing Unit in Harare, Zimbabwe.

Monitoring of the hits to the SDDF indicate that metadata records have been accessed from at least 29 countries. Over the period October 2000 to January 2001, there was an average of 251 visits (translating to an average 636 hits per week) to the SDDF. However, NSIF staff still field many telephonic or e-mail enquiries concerning the availability of spatial information; there is not much evidence to suggest that it is a reflex reaction of the geographic community within South Africa to turn to the SDDF when they wish to determine the existence and availability of spatial data they require. A study on spatial data sharing attitudes in South Africa revealed that many do not yet regard the internet as useful in sourcing or accessing data *(Uta Wehn de Montalvo, "Survey of Spatial Data Sharing Perspectives in South Africa", Ph.D dissertation, SPRU, University of Sussex, 1999).* This attitude cannot be ascribed solely to slow networks, as the attitude was more

prevalent within the private than the public sector (in South Africa, connections to the internet via the government network are slower that most other connections). There is actually a resistance to sharing data, stemming from a fear of "loss of control" over data if it is shared. Effort needs to go into promoting the benefits deriving from the sharing of data. A cost-benefit study conducted on investment in spatial information in South Africa in 1999/2000 showed that in most of the government components studied, the benefits are about to start outweighing costs only now. The only government agency studied which could already shows a dramatically favourably cost-benefit ratio was involved in extensive data sharing with other bodies.

2.2.2 Standard development and implementation

In 1999 a technical sub-committee was established within the South Africa's national standards body, the South African Bureau of Standards (SABS) to develop standards for geographic information. Currently four national standards are under development. This sub-committee also supports South Africa's participation in the ISO technical committee for geographic information standards, ISO TC211.

The provision of tools in support of implementing standards has proved a success. This may be illustrated by metadata: a South African metadata standard, to be based on ISO19115, is under development, but as an interim measure, the FGDC metadata standard was adopted. The provision of both a stand-alone and web-based capturing tool has lead to the adoption of the standard by many organizations contributing to the SDDF: as far as is know to NSIF staff, there is only one organization-wide metadata system in use in South Africa which is not based on this standard.

2.2.3 Policy development and institutional arrangements

A Draft Spatial Information Bill was published for public comment in November 2000 *(available from* http://www.nsif.org.za*, follow the "News" tab*) to provide for refinement before submitting the Bill to parliament (target date July 2001).The aim of the Bill is "to promote the efficient, economical and effective use of State resources as enshrined in the Constitution, by the sharing of spatial data and spatial information", and will formalize the establishment of the NSIF.

The current lack of a uniform policy across government departments and agencies with respect to the pricing of data and other conditions associated with its use represents a significant barrier to sharing data. The need for such policy was the impetus to drafting the Spatial Information Bill. Obliging statutory bodies to capture and publish metadata has been included in the draft Spatial Information Bill.

A Committee for Spatial Information has been established, to provide input into developing the NSIF. This Committee consists of senior representatives of government departments, and meets twice a year. Despite a poor understanding of technical issues by many attendees, there is considerable support for eliminating duplication of effort by government departments and agencies, as well as for obtaining more high level commitment to an integrated approach to building spatial data infrastructure.

Immense difficulty has been encountered in conveying the object of the NSIF, still perceived by many to be the creation of a "one-size-fits-all" national geo-spatial database. A pilot project using information from three departments and a semi-government funded organization, in order to depict the locations of funded projects on a map and obtain details on these projects through the map interface (*see* http://nsif.pwv.gov.za/idpv), may prove to have been more effective in illustrating why certain components of the SDI programme merit attention, than any number of presentations.

2.2.4 Knowledge sharing and networking within the geographic information community

In order to optimise the benefit to be gained from investment made in spatial information gathering and management, it is necessary to look beyond data issues, to the avoidance of duplication with respect to application building and organizational learning. Quarterly meetings were instituted in 1998 to provide a forum for discussions concerning the development of the NSIF and the sharing of information which could be of use to the geographic information community. These meetings are held in different venues across the country. The contact details of attendees collected at these meetings bear out the fact that the majority of attendees are resident in the region in which the meeting was held. Recently these meetings have evolved into "seminars", focusing on a topic of interest identified by the geographic information community. It is hoped that through the presentations at these seminars, points such as the need for standardization of geographic information and the capturing and publishing of metadata will emerge clearly. The seminars have proved popular and appear to be serving as a catalyst for the networking of users and developers of spatial information systems.

In addition to face-to-face meetings, communication within the geographic information community is promoted by maintaining a database of people who have participated in NSIF meetings. E-mails concerning meetings or requesting inputs on policy or standards issues are circulated to the almost 2000 "subscribers" in the contact database. The NSIF's web-site undergoes continuous development.

3. Initiatives to evolve SDI Africa

Working at a national level, NSIF staff have been very conscious that consideration needs to be given to developments beyond the borders of the country. They have consequently felt the need to participate in initiatives aimed as supporting the development of SDI in Africa as a whole. As both governmental and non-governmental organizations play a significant role in gathering spatial information, it is not surprising that several parallel initiatives have developed. The structures described below interact closely.

Arising out of a concern that Africa was underrepresented in international fora such as GSDI, two workshops have been convened to promote discussion on how to advance SDI development in Africa. The second was held in conjunction with GSDI 4 in March 2000 in Cape Town. At this workshop, an interim Task Team was formed, tasked with preparing the way for the creation of a possible permanent committee supporting SDI development. Two working groups, focusing on metadata and a geodetic reference system respectively, were also formed. The NSIF maintains a web page providing news and information on events relating to SDI in Africa (http://www.nsif.org.za/africasdi_main.htm/), and this has

proved to be one of the most often visited pages on the NSIF web-site. Informal networking lead to a week long working session on metadata in Pretoria in December 2000, involving representatives from South Africa, Ethiopia and Ghana.

The sub-committee on geographic information (known as CODI-GEO) which forms part of the United Nations Economic Commission for Africa's (UNECA) Committee on Development Information (CODI), and which replaced the Regional Cartographic Conference, represents an important forum for taking forward the building of SDI in Africa (http://www.uneca.org/programmes_index.htm). A workshop on SDI is planned for the next CODI meeting to be held in September 2001 in Addis Ababa. UNECA convened a meeting of experts in November 2000, to derive a strategy to "raise awareness of African governments and other sectors of society of the importance of geographic information in socio-economic development and to identify practical mechanisms to facilitate spatial data collection, access and use in the decision-making process, both nationally and regionally, through a participatory approach." Not surprisingly, the report placed some emphasis on SDI.

EIS-Africa, is a non-profit, non-governmental organisation, networking individuals and institutions to promote increased usage of reliable information in decision making, in the context of environmental management for sustainable development (http://www.grida.no/prog/glob/eis-ssa/index.htm/). With working groups focussed on data standardization and harmonization, identifying and publishing best practices, policy relating information, the economics of EIS and training and capacity building, EIS-Africa's activities parallel those of national and regional organisations involved in developing SDI.

4. Challenges facing SDI development in Africa

Developing SDI in Africa depends on willing participants and the availability of resources. These factors are, of course, inter-related.

In terms of willingness, both policy makers and practitioners need to become willing participants in building SDI. High-level awareness of the importance of using geographic information in supporting sustainable socio-economic development is required at both national and regional levels. Government funding for developing spatial data needed will be provided in competition with funding for the development of other basic infrastructure (e.g. a road or telecommunication network) or in response to social needs (e.g. housing, education). It is necessary then, to convince funders that the returns on investing in gathering spatial data will outweigh the costs in the medium to long term. There is a need for countries (regions) to develop a vision and strategy for a co-ordinated approach to building geographic data sets and accompanying infrastructure facilitating its use. Those involved in gathering and managing spatial data need to begin to "think globally" before they act: many are used to operating within their isolated information community, when technologies were such that there were not many users of (digital) spatial data and consequently do not yet consider the fact that their data gathering exercises could be of use to others. Energy needs to be focussed on identifying and implementing mechanisms to channel the collective efforts of organs of state, non-governmental organisations and the private sector towards the creation of enduring SDI.

Sustained funding is required for the ongoing development of SDI. Needed are cost-effective projects which could be used to demonstrate the power of using spatial information, thereby capturing the attention of decision makers with the power to fund the further development of needed geographic data sets. Showing immediate benefits to funders is important to sustain their ongoing support. However, a balance is required between the need for tangible, useful products in the short term, and the less immediate goal of achieving a coherent SDI. Taking due care over how a project is executed is also important for achieving cost-effectiveness in the longer term.

In addressing the need for resources, it is also useful to consider the harnessing of the inputs of "external players": consideration needs to be given on how international endeavours and donor funding can be used to build SDI nationally and regionally, particularly in less developed regions. For example, at least 18 countries in Africa are currently participating (or contemplating participation) in Global Map, meaning that uniform data across Africa, along with standardized metadata will be produced. While this constitutes only a third of the countries in Africa, it is more than the number of countries that were represented at the previous CODI-GEO meeting. Further, donor-funded projects offer the injection of significant resources into building SDI. Ideally, each project or programme should contribute to and extend the SDI in a coherent way. Mechanisms are needed to ensure that co-ordination between these projects is achieved, as well as coherence with the efforts of national and regional bodies.