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Political aspects of Spatial Data Infrastructures *

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1 Introduction

The geographic information is the information that describes phenomena associated directly or indirectly with a location with respect to the Earth surface. Nowadays, there are available large amounts of geographic data that have been gathered with different purposes by different institutions and companies. Furthermore, the volume of this information grows day by day thanks to important technology advances in high-resolution satellite remote sensors, GPS, databases and geoprocessing software notwithstanding an increasing interest by individuals and institutions. Even more, it is possible to georeference complex collections of a broad range of resource types, including textual documents, real-time acquired observations, legacy databases of tabular historical records, multimedia components such as audio and video, and scientific algorithms.

Additionally, in most cases, data that are collected for a particular project are useful for other projects. This fact is even more pertinent with the recent "commoditisation" of data and information. The costs involved with data collection are taken into account in project planning, along with attempting to maximize the use of the data from a project. Furthermore, it should be also realized that some data required for particular decisions are transient and may no longer be able to be collected when required. An example of this occurs when decisions concerning agricultural practices must be made. These decisions will often require environmental data spanning over several years. This data must be collected when they are available, even if the need for them is not present at the time of collection, otherwise it is not possible to collect the data for past years when they are later needed. Thus there is a need to store this type of data in databases and make them accessible to others. These databases become a shared resource, which must be maintained continuously. Furthermore, one might be interested in the interoperation of those resources, which are maintained at the state or national level, and sometimes by private corporations. In such cases, coordinating authorities are needed to assign custodianship and usage privileges for subsets of the data to different users (which may be agencies). Users in the general community are then able to expect the data to be available, and with

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network technology, to be accessible transparently. At this point, these collections of resources and services have acquired the status of an infrastructure: a Spatial Data Infrastructure.

According to [1], the main components of a spatial data infrastructure should included data providers (sources of spatial data), databases and metadata, data networks, technologies (dealing with data collection, management, search and representation), institutional arrangements, policies and standards, and end-users (see figure 1(a)).

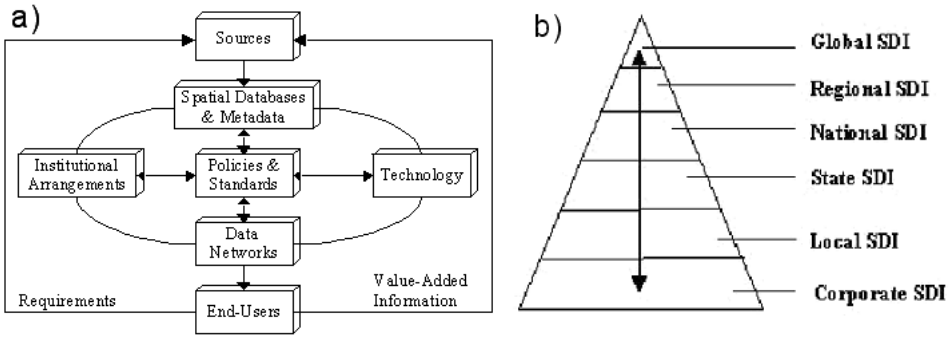

Fig. 1. a - A system view of the spatial data infrastructure components (taken from [1]); b - Spatial data infrastructure hierarchy (taken from [2])

Maybe, apart from technology component, the rest of the components shown in figure 1(a) have political implications. The following section details these aspects.

2 Political aspects of a Spatial Data Infrastructure

2.1 Policies and Standards

Standards constitute the link among the different components of a spatial data infrastructures providing common languages and concepts that make possible their communication and coordination. The standardization processes in spatial data infrastructures involve not only the organization of data, but also issues related to the capture and integration of these data. Additionally, it is necessary the establishment of general guidelines to be followed by all the actors of a spatial data infrastructure. This guidelines should include several aspects such as architectures, processes, methods or standards. The responsibility for the establishment of these guidelines should be assumed by public administrations. They are the necessary arbitrators because they have no private interests (especially, economic ones) in choosing one solution or another, i.e. their main interest is the social benefit.

In addition, as the volume of information grows, issues of quality and reliability are becoming more complex. The increase in the diversity of sources of information is an additional complicating factor. Problems of context, provenance and timeliness become much more complex with the added dimension of

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distribution. Users of on-line digital geographic information will tend to trust data that come from reputable institutions, with documented assurances of quality, and to mistrust data of uncertain origins, just as they do today by acquiring them off-line. In this sense, the active participation of public administration at all levels will be needed to guarantee a minimum level of quality.

2.2 Human Resources

The development of spatial data infrastructures must be done over the necessity of the users, both end-users and data providers (sources). On the other hand, the work to implement and maintain a spatial data infrastructure should be done by qualified teams of researches and developers. All these people integrates the human resources that are necessary for the development of spatial data infrastructures. Goverments are the only institutions which have enough capacity for providing the necessary human resources (directly or by sponsoring teams) for the development of spatial data infrastructures.

2.3 Institutional Arrangements

It is necessary the establishment of political decisions such as the creation of institutional framework. Agreements must be ratified to establish a national spatial data infrastructure, for coordinating the formation of regional spatial data infrastructures and for linking them to form the global spatial data infrastructure. As a result of developing spatial data infrastructures at different levels, a model of spatial data infrastructure hierarchy that includes spatial data infrastructures developed at different political-administrative levels was developed and introduced by [2](see figure 1(b)). This model presents an spatial data infrastructure hierarchy is made up of inter-connected spatial data infrastructures at corporate, local, state or provincial, national, regional and global levels. In the model, a corporate geographic information system is deemed to be an spatial data infrastructure at the corporate level-the base level of the hierarchy. Each spatial data infrastructure at the local level or above is primarily formed by the integration of spatial datasets originally developed for use in corporations operating at that level and below. This means that the realisation of large-scale globally spatial data infrastructures depends as much on collaborative effort as it does on the development of new technologies in order to develop systems which truly integrate their components. The level of collaboration required, across disciplines as well as across geographical boundaries and Governments, will be much higher than we have previously encountered.

2.4 Spatial Databases and Metadata

Spatial data infrastructures should be created over the geographic data, stored in the spatial databases, and their description (metadata). In this sense it is necessary to take into account that the main creators and users of geographic information are the public administrations. In recent years nations have made unprecedented investments in both information and the means to assemble, store, process, analyze, and disseminate it. Thousands of organizations and agencies (all levels of government, the private and non-profit sectors, and academia) throughout the world spend billions of euros each year producing and using

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geographic data ([3]). This has been particularly enhanced by the rapid advancement in spatial data capture technologies, which has made the capture of digital spatial data a relatively quick and easy process. In addition, around 80% of the databases used by them contain some kind of geographic reference (postal codes, cartographic coordinates...). All this information is used for the implementation of the public services related with their role in the different levels of government. The participation of public administrations in the development of spatial data infrastructures is basic because they are the owners of the core data and metadata that should be provided.

2.5 Data Networks

Spatial data infrastructures should be open systems deployed over data networks that provide the channel for accessing the services from remote systems and users. As it is happening with other basic infrastructures for the development of a country such as classical infrastructures (water, electricity, gas), transport or telecommunication, Governments have the responsibility of the coordination of the construction of a data network that could provide the support of a spatial data infrastructure.

3 Conclusions

Nowadays, Spatial Data Infrastructures are considered so relevant as the transport or utilities (e.g. water gas or electricity) infrastructure of a nation. And the creation of these infrastructures should follow a set of common strategies that makes possible the coordination among different initiatives. Despite the existence of a favorable environment for the creation of this kind of infrastructures, the initiatives launched are having a lot of problems in their consolidation. Far from being a problem concerned with the development of technology able to support the necessary services, the most complex problems to solve are those related with the political aspects. This paper has remarked the importance of these elements in the development of spatial data infrastructures.

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