

PROJECT 2

GLOBAL SURVEY AND ANALYSIS OF NATIONAL SPATIAL DATA INFRASTRUCTURE ACTIVITIES

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2. Abstract

Nations across the globe are rapidly developing and expanding their national spatial data infrastructures (NSDIs). Compatibility among these efforts in terms of policy, technical, and operational arrangements that would better allow sharing and exchange of spatial data among nations has become a major challenge. Knowledge is lacking of the current and planned approaches being pursued in each nation as well as details about the similarities and differences among nations in the approaches they are using. This project will gather detailed information on the national spatial data infrastructure activities of a large number of nations and will identify basic elements and characteristics that appear to be foundational to most efforts. Various options and models for global coordination, facilitation and cooperation among national and regional spatial data infrastructure activities will be articulated along with the perceived technical and social benefits and drawbacks of each option. Explicit recommendations will be derived for establishing NSDIs that are compatible with the initiatives of other nations. To encourage movement towards widespread sharing of geographic information on a global level, library-like spatial data sharing and exchange models will be explored in detail.

3. Project Description

3.a Research to be Undertaken

3.a.1 Objectives

Many national governments throughout the world are involved in developing spatial data infrastructures that will better facilitate the availability and access to spatial data for all levels of government, the commercial sector, the non-profit sector, academia and citizens in general. The primary objectives of this research project are to discover and track the status of national spatial data infrastructure (NSDI) activities across the globe, greatly expand the number of nations from which status reports on NSDI activities are received, and provide detailed analyses of the results. The ultimate goals using the information collected are to explore whether sufficient similarities exist among national approaches to describe basic models of national spatial data infrastructures and their characteristics and to assess possibilities for global coordination, facilitation and cooperation among national and regional spatial data infrastructure activities. Where feasible, explicit

coordination recommendations arising from analysis of the data will be offered. After the first year, the investigative process will be expanded to explore institutional arrangement models that could lead to increased wide-scale sharing of geographic information. In particular, factors affecting the ability and willingness of data suppliers from around the globe to make datasets available through library-like electronic sharing arrangements will be explored.

3.a.2 Approach in Year 1

The approach used in the first year of the project follows directly from and expands upon work accomplished in the summer and fall of 1998. With support of the Federal Geographic Data Committee (FGDC) and the National Image and Mapping Agency (NIMA), an initial survey was accomplished in order to gather baseline information on the nature, extent, characteristics and status of national spatial data infrastructure (NSDI) activities of countries around the world. A questionnaire consisting of 23 open-ended questions was sent electronically and by hard copy to contacts in over one hundred nations. By the end of that year, when the initial results were reported, responses had been received from 27 nations and several multi-nation regions. The questionnaire, the list of nations from which responses were received, and each full response may be found at <http://www.spatial.maine.edu/~onsrud/harlan/gsdi/gsdi.htm>.

In this proposed extension of the previous research we will seek participation from many more nations. Names of individuals in each nation who are likely to be able to respond knowledgeably on the subject matter are continuing to be compiled. With a core of close to thirty national responses at hand and published on a central web site, it should be much easier to convince others to submit responses for their nations. In addition, language has been an issue in regard to some respondents. Therefore Spanish and French versions of the questionnaire also will be offered on the web site. For those nations for which we have previous responses, we will request updates in order to track changes in thinking and approaches within these nations over the past two years.

A basic precept of the earlier survey was that information about the status of spatial data infrastructure developments in each nation should be reported through an open process by individuals within each nation rather than by outsiders. A further precept from the outset was that we would receive and post on the web responses from any knowledgeable individuals within a nation willing and able to respond to the questions. Thus there were no "official responses" and indeed there have been multiple responses from some nations by individuals with differing views. The "open access" approach followed in regard to receiving responses and allowing open reading of the individual responses has facilitated the gathering of data (i.e., both corroborating and conflicting) and has facilitated communication among nations regarding alternative policies and technical options that nations might consider. Our intent is to continue and expand our "open access" approach to the greatest extent possible in accomplishing the new work.

The previous "Survey of National Spatial Data Infrastructures" included questions on the following topics:

- Policy Issues - NSDI leadership, availability of spatial digital data, mechanics of access, legal and economic frameworks for access, data collection coordination, pricing, commercial involvement, public domain data sets, public good aspects of NSDI, and privacy protection
- Operational Issues - legal authority for the NSDI, funding, inclusiveness, components of the NSDI, support of research, linkage to general information technology standards, global spatial datasets, ties to global or regional infrastructure initiatives, long term visions and strategic plans, grand challenges
- Background Issues - respondent contact information, resources for finding further information about the specific NSDI

Analysis of the results from the initial subset of nations suggested the following possibilities for the future in regard to the development of global spatial data infrastructure concepts:

1. The concepts of metadata, core data, data standards and clearinghouse appear to be relatively well accepted as constituent parts of NSDIs across the globe.
2. Agreement among nations on metadata standards for spatial data appears to be a possibility.
3. If nations agree that metadata for most NSDI datasets may be made available on-line, the concept of a coordinated global spatial data infrastructure (GSDI) becomes much more realistic.
4. Agreement among nations on a small number of core data sets at specified scales may be a realistic possibility.
5. Any vision for a workable GSDI probably would need to involve networks of decentralized geographic data clearinghouse nodes. Such data collections might be made available by government agencies at various levels, by the commercial sector, or by both.
6. Wide variations exist among nations regarding legal and economic policies. Forums other than GSDI may be more appropriate in resolving conflicts in data policies among nations.

At the end of year 1, when updates to the previous responses have been received and many more nations have been added to the response pool, the above six implications drawn from the initial survey responses will be reassessed. The new larger pool of data also will be explored for additional and alternative implications.

3.a.3 Approach in Subsequent Years

In the second and following years of the project, we will continue to solicit and add responses from additional nations. Updates from those who have responded previously will be solicited only every other year, during even years. This longitudinal information will allow tracking of trends and changes in approaches over time.

However, the greatest thrust in the second and subsequent years will be exploration in much greater depth of the ability and willingness of contacts in each nation to make spatial datasets available through library-like operational environments defined by contractual arrangements. The term "library" is intended as a metaphor in this context to describe an institutional arrangement under which the rights and obligations of spatial data collectors, archivists, disseminators and users are well defined through contract language and any organization choosing to bind themselves to the specified rights and obligations may join the arrangement.

A "chaordic" organization approach has been suggested in the U.S. as an appropriate means to rapidly populate the NSDI with data from multiple sources and to make spatial data and services far more accessible and useful to larger numbers of potential users. Chaordic organizations have the characteristics of allowing structure, people, and practices to continuously evolve in pursuit of their purposes (chaos) while, in a narrow band of activity essential to the success of the whole, they engage in the most intense cooperation (order). (Dee Hoc) The chaordic relationship is ultimately defined by binding operating agreements to which all parties choosing to participate must abide. The problem with the approach as discussed to date within the NSDI/GSDI context is that the only chaordic model held up as being operational and "successful" is one based almost exclusively on a marketplace model. The implication is that if the NSDI or GSDI are to accommodate this model, society must move to treating data, information, and knowledge primarily as commodities. Yet other values and policies are at stake. Data, information, and knowledge are critical to learning, communicating, and supporting democratic processes. To treat them primarily as commodities harms other valuable societal functions of information. In addition, unlike money or consumable goods, data, information and knowledge possess the classic characteristics of "public goods" which makes them very difficult to manage through a marketplace or e-commerce model.

The "library system" is a far more appropriate chaordic model to explore relative to possible future directions for the GSDI and as a means for providing incentives to data collectors to document their spatial datasets. Libraries as a system have almost all of the characteristics of a chaordic

organization and yet the library system supports strong public goods, access and equity principles while fully protecting the intellectual property rights of authors and publishers. The library system also fully engages and depends upon the private sector and government to provide the content that it shares or otherwise disseminates.

A major difference between a typical nation's library system and its evolving NSDI is that authors have sufficient incentives to produce traditional books and maps and make them available through the library system while incentives to make spatial datasets available are lacking. The incentive structure involves both technical and legal framework issues. It should be noted that direct monetary incentives are often not a motivating factor or are a very minor one for most scholars and others whose intellectual works are made available through the traditional library system. One should not assume that monetary reward will be the primary incentive for encouraging most parties to make their spatial data available through an NSDI. The balance of laws is skewed in electronic environments due to rapid technological advances and the inability of lawmaking to keep pace. One way to reestablish a balance that would provide sufficient incentives for producers to make works available within NSDIs and ultimately the GSDI is through a set of operating agreements to which all parties taking advantage of the system might bind themselves.

In years two and three, this research project will explore the conditions under which incentives could be sufficient to allow a wide range of spatial data producers from across the globe at many levels to make their works available through electronic library-like arrangements while maintaining substantial access, use, and equity rights for users. Thus, a subset of respondents from across the globe will be invited to work with the principal investigator in developing a shared purpose, shared core principles, an organizational concept, constitution, bylaws, and operating agreements that might serve as an initial foundation for widespread sharing of spatial data among nations. Stated another way, research in years 2 and 3 will explore the extent to which the library as a chaordic organization has lessons to offer for allowing the GSDI to become far more useful for its potential users. Assuming substantial progress in developing and instituting conceptual and operational arrangements promoting widespread sharing, years 4 and 5 will be used to hone the models and expand participation in the global cooperative research and development effort.

3.a.4. Expected Outcomes

In the final years of the millennium, the concept of a Global Spatial Data Infrastructure (GSDI) and its potential realization has captured the imagination and attention of policy makers, administrators, academia, industry and affiliated professions. This research will develop an open written record of NSDI activities around the globe and, as updates are made over time, will create a record of changes in the approaches and policies used by nations. The similarities among approaches used by nations will be used to describe basic elements, characteristics and overall models of national spatial data infrastructures.

Various options for global coordination, facilitation and cooperation among national and regional spatial data infrastructure activities will be articulated along with the perceived technical and social benefits and drawbacks of each option. Explicit recommendations will be made for establishing NSDIs that are likely to be compatible with the initiatives of other nations.

To encourage movement towards widespread sharing of geographic information on a global level that builds from existing NSDI activities, a subset of respondents from diverse nations will explore and develop with the principal investigator a set of binding operating agreements that might lead government agency and commercial entities within their nations to enter into library-like data sharing and exchange arrangements. The types of agreements to be explored and developed will be similar in nature to those that currently establish the frameworks within which libraries worldwide exchange and share resources.