THE SPATIAL DATA TRANSFER STANDARD: STATUS AND PLANS FOR IMPLEMENTATION

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ABSTRACT

The Spatial Data Transfer Standard was submitted to the National Institute of Standards and Technology in early 1992 as a Federal Information Processing Standard. The Standard allows for the exchange of digital spatial data in a variety of formats between noncommunicating computer systems. This summer, the U.S. Geological Survey began the process leading to American National Standards Institute and International Standards Organization approvals of the Standard.

The U.S. Geological Survey continues to coordinate efforts to create an accessible and user friendly Standard. Such efforts include conducting training and workshops as well as the creation of Spatial Data Transfer Standard profiles, user's guides and, where possible, public domain software tools to support the encoding/decoding process.

The Spatial Data Transfer Standard was designed to accommodate a very large number of spatial data types. A profile is a limited subset of the Standard designed to support a specific data type. Profiles, therefore, will provide the most efficient mechanism for users to implement the Standard. Indeed, limiting the options and encoding choices within the Standard makes it easier to develop encoding/decoding software. Upon the National Institute of Standards and Technology's approval of the prototype Spatial Data Transfer Standard profile, for vector data with topology, the U.S. Geological Survey will coordinate the development of additional profiles to support other data types.

The development of a library of public domain software tools continues to be coordinated by the U.S. Geological Survey. The library will assist users in interfacing with the Spatial Data Transfer Standard's Vector Profile. Vendors must also recognize that only through their efforts will encoders/decoders be developed to their proprietary data models.

INTRODUCTION

Recent advances in geographic information system technologies and digital cartography have resulted in increased demands for digital spatial data. Unfortunately, existing hardware and software capabilities and the lack of data exchange standards have inhibited the transfer of spatial data between data producers and users. To meet this demand, the Spatial Data Transfer Standard (SDTS) was designed to facilitate data transfer between dissimilar spatial data bases. Implementation of the SDTS will increase access to and sharing of spatial data, reduce the cost of developing data bases, and improve the quality and integrity of spatial data and related documentation. In addition, the SDTS will reduce duplication of effort in data production and maintenance and will make a national spatial data infrastructure practicable.

STATUS

In April 1991, after nearly 10 years of development and testing, the SDTS was issued by the National Institute of Standards and Technology (NIST) as a proposed Federal Information Processing Standard (FIPS). Following a 90-day formal public review and comment period, the Technical Review Board (TRB) overseeing the development of the SDTS met in October 1991 to arbitrate the review comments. The document was then edited according to decisions made by the TRB. The edited SDTS was forwarded to the Department of Commerce for processing as a FIPS in February 1992. Final approval and publication is expected in mid-1992.

When implemented as a FIPS, the SDTS will serve as the national spatial data transfer mechanism for all Federal agencies and will be available for use by State and local governments, the private sector, and research and academic organizations. The success of any standard, such as the SDTS, depends on its acceptance by the user community. Therefore, the U.S. Geological Survey (USGS), as the designated SDTS maintenance authority, is committed to

providing implementation support to the greatest extent possible to increase access to and use of the SDTS.

IMPLEMENTATION SUPPORT

The USGS has identified several key program elements necessary to promote acceptance of the SDTS. The first element, FIPS approval of the SDTS, is pending. When the SDTS becomes a FIPS, it enters a 5-year maintenance cycle, at the end of which it will be possible to modify the SDTS to meet the changing demands of the user community. Because of its modular design, the SDTS can be changed as the requirements for its use change. Additional approvals will be sought from the American National Standards Institute and the International Standards Organization during 1993 in an effort to broaden access to the SDTS among the commercial and international communities.

Profile development is an important element for the successful implementation of the SDTS. A profile is a clearly defined and limited subset of a standard that is designed for use with a specific type of data. The SDTS contains a full range of capabilities and options designed to handle a wide spectrum of possible geographic and cartographic data structures and content. Because handling this range of options is such a difficult task for encoding and decoding software, the best way to implement the SDTS is to define a profile with few, if any, options. Software can then be designed to handle just these options. Regardless of which options are specified for a given profile, all profiles will share important common characteristics.

The USGS plans to coordinate the development of profiles with the user community. The first of these profiles, the Vector Topological Profile, is currently in a review and testing period; this test period will end late in 1992. The intent is to have this prototype profile rigorously tested to ensure that it appropriately handles vector data and then to forward the profile to the NIST for FIPS approval. Efforts have been initiated recently by the USGS to develop a prototype raster profile; this effort is expected to continue through 1993. The requirement for additional profiles, such as CAD/CAM and graphics profiles, will also be evaluated in the future.

Users guides are critically needed to increase the knowledge and understanding of the SDTS within the community. The SDTS describes content, structure, and format; it is not an easy document to comprehend. To address the complexity of the document, users guides need to be developed for the SDTS, for the various profiles being defined, and for the software tools being developed. The USGS will coordinate the development of these users guides over the next few years.

Software development is an integral part of SDTS implementation. Software tools, such as encoding, decoding, and display tools, must be developed. It is expected that the vendor community will assume a large part of this responsibility. The USGS is designing a processing system to support SDTS transfers of its own digital spatial data, such as Digital Line Graphs and Digital Elevation Models. The USGS is also developing a suite of public domain software tools designed to support the encoding and decoding of logically compliant SDTS data in and out of the required ISO 8211/FIPS 123 physical file implementation. This software will be available for use in mid-1992 by the vendor community to develop turnkey systems conforming to the SDTS.

One part of the SDTS presents a standard model for a spatial features data dictionary as well as a list of terms and definitions for entities and attributes. This feature and attribute glossary provides a foundation for standardizing spatial features. At the present time, the glossary contains only a limited set of hydrographic and topographic features. Because this glossary is not complete, conformance is optional in the prototype Vector Topological Profile; however, conformance to the model is mandatory. For this part of the SDTS to be useful, additional terms and definitions must be included for other categories of data, such as cadastral, geodetic, and geologic, and the current set of hydrographic and topographic features must be expanded. The NIST intends to establish a Spatial Features Register, designed to facilitate this effort. Input from the Federal community will be coordinated through the data category subcommittees of the Federal Geographic Data Committee (FGDC); however, the USGS intends to solicit input from the non-Federal spatial data community as well. A strategic plan to maintain this

part of the SDTS, using the NIST Spatial Features Register, is being developed. Because the register will allow users to dynamically update the glossary, this part of the SDTS will evolve over time.

The USGS will continue to conduct SDTS-related workshops and other presentations to educate the spatial data community and to promote the use of the SDTS. Implementation presentations are planned for the major professional organizations, such as Association of American Geographers, American Congress on Surveying and Mapping, American Society for Photogrammetry and Remote Sensing, Automated Mapping/Facilities Management International, Institute for Land Information, International Society for Photogrammetry and Remote Sensing, and Urban and Regional Information Systems Association. In addition, the USGS, the NIST, and the Standards Working Group of the FGDC plan to sponsor implementation workshops during the coming year.

The final program element necessary to support acceptance of the SDTS is program coordination. This coordination involves developing support activities within the USGS, facilitating similar activities external to the USGS, and interfacing with related standards development activities ongoing in the spatial data community.

CONCLUSION

The Department of Commerce's approval of the SDTS as a FIPS is a major milestone for the spatial data community. Although the USGS is committed to facilitating a wide range of activities designed to promote acceptance of the SDTS, all members of this community must contribute to these efforts to ensure the success of the SDTS. For additional information concerning the SDTS program within the USGS, or how to participate in these developmental activities, please contact:

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