Report and Recommendations:

Spatial Data Standards Summit
on the
Tri-Services CADD/GIS Spatial Data Standards
TSSDS CD-ROM

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1. Introduction

1.a. Purpose

This report provides an overview, a detailed discussion of findings, and the resulting recommendations from the Spatial Data Standards Summit sponsored by the Federal Geographic Data Committee (FGDC) and organized by the Environmental Resources Research Institute (ERRI) of The Pennsylvania State University and the Pennsylvania Mapping and Geographic Information Consortium (PaMAGIC) held at The Pennsylvania State University in October 1997. The meeting materials are provided at Appendix A.

1.b. Background

The use of Geographic Information Systems by government, educational institutions, and the private sector, has grown dramatically in Pennsylvania during the last decade. While the current number of GIS users in state and local government and private industry in Pennsylvania is unknown, it is safe to conclude that GIS has become an important tool at all levels. This rise in the use of GIS and spatial data has led to a growing need for spatial data standards for the purposes of archiving and sharing data. The Spatial Data Standards Summit was developed by ERRI and PaMAGIC as a means for providing feedback to the FGDC relative to civil use of the standard and to improve state-wide spatial data standards awareness through the use of the Tri-Service Technology Center's Computer-Aided Design and Drafting/Geographic Information Systems (CADD/GIS) Spatial Data Standards (TSSDS) CD-ROM. The desired outcome of the summit was to suggest changes to TSSDS so as to make them more relevant to Pennsylvania.

In order to accomplish this task, a group of experts from the utilities and environmental sectors of state and local government, university, and private industry were asked to attend a two day summit to evaluate the usability and applicability of the TSSDS in their current environments. In addition, these experts were to provide recommendations related to the modification of the TSSDS content, as well as recommendations for the future implementation of spatial data standards state-wide. The services of a professional facilitator were used to lead the participants through a series of sessions which focused on significant issues, common needs, and the expansion and modification of the Utilities and Environmental Hazards geospatial data standards from the TSSDS.

1.c. Process

1.c.1. Participants

Twenty participants were selected from a list of utilities and environmental experts in state and local government, utility company, and university sectors across the State (See Appendix B). These individuals were selected based on

their knowledge of and experience with GIS, as well as their expertise in either the utilities or environmental hazards areas. The number of participants was maintained at approximately twenty to facilitate the exchange of information and to fit within the Team Decision Center.

1.c.2. Facilities

The Team Decision Center at the Penn State Conference Center in University Park, PA was the site of the summit. The Center maintains terminals for use in "Electronic Meetings." In addition, the participants were provided with laptop computers to run the TSSDS while participating in the electronic meeting. An instructor's station and display were provided to the facilitators and speakers. Presentations were made using Microsoft Power Point. The group sessions were conducted with the use of Decision Support Groupware.

1.c.3. Facilitators/Summit Organizers

The Summit organizer was Dr. Todd Bacastow, Senior Research Associate at the Environmental Resources Research Institute, who was also responsible for the summit; and Debra Basha, a professional facilitator from Soza and Company, LTD assisted. Dr. Bacastow introduced the purpose of the summit and continued to assist in leading the discussions throughout the two days. Maurie Kelly provided technical assistance and gathered information to prepare this report.

1.c.4. Group Leaders

The group leaders were chosen for their expertise in the environmental and utilities sectors. Ron Hermany of the Pennsylvania Department of Environmental Protection and Tim Driscoll of the National Fuel Gas Company were selected to serve as group leaders during the summit.

1.c.5. Methodology

The preplanning tasks which were completed by Dr. Bacastow and Ms. Basha prior to the summit included:

- Identifying clearly stated objectives.
- Identifying possible outcomes of the meeting.
- Selecting the appropriate methodology and approach.
- Organizing subgroups within the environmental hazards and utilities classes and providing participants with pre-assigned tasks and material.

Prior to the summit, the participants were provided with a copy of the TSSDS CD-ROM and related documentation, either in the utilities or environmental hazards areas. They were requested to review these materials and to become familiar with both the function and the content of the TSSDS prior to their arrival.

The facilitators approached the sessions in a way that would capitalize on the use of Decision Support Groupware, specifically, Ventana's GroupSystems for Windows. GroupSystems collected responses and input from the participants which was then analyzed and used as the basis for this report. The major advantage of the Groupware environment ensured that the maximum amount of information was collected from the session participants during the limited time available.

The GroupSystems approach is used to encourage collaboration and improved productivity through the use of a collection of tools that support group processes such as brainstorming, group validation, list building, information gathering, voting, categorizing, prioritizing, and consensus building. Results of all groups are simultaneously accessible to all. The tools are used interactively by participants at separate workstations or by subgroups gathered around a single terminal.

1.c.6. Approach

The summit organizers used a three-tiered approach. The first phase included several speakers who served to familiarize the participants with the issues surrounding spatial data standards and TSSDS. Dr. Bacastow introduced the participants to the objectives of the summit. Dr. Donna Pequet, Professor in the Geography Department of The Pennsylvania State University, offered a presentation on the data dictionary as a critical element in successful GISs and gave the participants historical perspectives on the use of cartographic standards. Kevin Backe of the U.S. Army Topographic Engineering Center introduced background information and instructed the group in the use of TSSDS. Presentations of Dr. Peuquet, Ms. Basha, and Mr. Backe are provided at Appendix E.

The second phase was structured to allow a substantive evaluation of the presentation, database structure, and contents of the TSSDS. After the participants achieved a basic understanding of TSSDS and it's functions, they were asked to evaluate assigned classes and types based on the need for spatial data standards within Pennsylvania. This was accomplished by dividing the group into six subgroups, three utilities and three environmental hazards, each group using a different computer. The participants were given the opportunity to provide input via Groupware. Comments were input individually and were displayed for the all participants to see. The evaluation of the Utilities and Environmental Hazards classes was tackled by the subgroups with the assistance of the group leaders. The subgroups were asked to submit comments related to the validity of their pre-assigned areas including:

- General Comments
- Class/Type Content

- TSSDS Structure
- TSSDS Presentation
- Class/Type Definitions

The group leaders were responsible for maintaining the pace of discussion and served as resource persons when questions arose.

The final phase of the summit allowed substantial time for a discussion of issues related to future implementation of standards in Pennsylvania state-wide. Groupware provided an outlet for comments related to policy issues, approaches that would encourage adoption, and relevancy to Pennsylvania's needs.

2. Discussion of Findings

2.a. General

The following is a summary of the individual GroupSystems inputs contained in Appendix F1. Most participants displayed only a basic knowledge of FGDC standards and the efforts of the Federal Geographic Data Committee. A local organization, the Pennsylvania Mapping and Geographic Information Consortium, was the source of much of the information related to the need for spatial data standards imparted to the participants prior to the summit. Despite the fact that many of the participants were not currently employing a spatial data standard in their activities, there was agreement throughout the group that standards, such as those found on the TSSDS, are useful and necessary. Particular areas of interest were in developing standards to enhance the sharing of data among state, local, and federal government agencies. It was suggested that an emphasis on the use of GIS in the development of 911 systems would lead to a greater need for sharing local data.

2.b. Presentation Issues

The following is a summary of the individual GroupSystems inputs contained in Appendix F2. The presentation aspects of TSSDS generated a wide variety of comments. Although the overall presentation of TSSDS was seen as less significant than the other issues discussed during the summit, the participants demonstrated an underlying interest in the ease of use and accessibility. It was noted that the ease of use is paramount when attempting to promote the adoption and dissemination of standards. In general, the presentation aspects of TSSDS were acceptable to the participants. The interface was found to be logically organized and functionally appropriate to the purpose. Significantly, there was interest in certain system specific interface/output capabilities, such as generating more SQL to create database tables.

The most frequently mentioned aspect of the interface was the browse function. This was found to be highly useful and it was recommended that the user have the ability to go directly to browse without having to navigate

through other screens. Integration of the browse capability was desired for the purpose of moving between classes easily.

Several other comments were made related to the presentation of TSSDS. The size and location of icons and symbols generated a number of responses. It was suggested that if TSSDS was to be used both for its functions and its content, an automated metadata developer function should be included for the purpose of documenting data. In addition, there were some negative comments in relation to the lack of symbols in the database. Ideally, symbols should be included in the presentation of information and should be visually associated with each entity. A final comment recommended that TSSDS be compatible on a number of platforms. It was noted that a great number of GIS programs are UNIX based and, therefore, TSSDS should not be solely wedded to the windows environment.

2.c. Structural Issues

The following is a summary of the individual GroupSystems inputs contained in Appendix F3. The second issue to be discussed was the structure of the database. The discussion of structural issues focused on several areas:

- Did the structure satisfy the existing needs of the participants?
- Is the structure adequately defined?
- Are the relationships clear?
- What could be changed within the structure that would further meet the needs of the participants?

The overall structure of the database seemed applicable to the experience and needs of the participants. They responded that having access to this type of information would make them more efficient in their current positions and, with some minor modifications, would be highly applicable in their current environments.

Questions were raised about the definitions within the structure. For example, a participant suggested that projects such as new highway corridor impacts would relate to multiple entity classes—environmental hazards and transportation entities. If TSSDS is to be widely adopted, the ability to integrate or span entities will be a significant factor. It was mentioned that one of the unique things about a GIS is its ability to integrate entity sets and this should be facilitated by any data standard.

The relationships among the sets, classes, types, entities, tables, and attributes were clear to most of the group. However, the discussion of domains and tables would have added another dimension to an already complex standard.

2.d. Review and Comment on the Entity Classes and Types

Changes that were suggested by the group included simplifying definitions, adding entities such as hydrogeology, and defining geospatial elements more clearly. A detailed discussion of these suggested changes are provided at Appendix F4 relative to the Utility standards and Appendix F5 relative to the Environmental Hazard standards.

2.e. Implementation Issues and Additional Questions

The following is a summary of the individual inputs contained in Appendices F6 and F7. The implementation of state-wide standards was viewed as a necessary, but daunting task by the summit participants. Obstacles to implementation that were noted included:

- Reluctance by those with existing data standards to alter the current way of doing things or adopt new standards.
- The lack of a one-to-one relationship between the TSSDS standards (which are perceived to be focused on military entities) and standards that are relevant to Pennsylvania.
- A lack of awareness of available spatial data standards.
- The lack of a clearly articulated need for standards.

Further discussion and education are necessary for the standards to gain broad acceptance. Organizations with established systems would find it difficult to adopt an unrelated set of standards without extensive training and educational opportunities. A well designed and executed educational program is needed, however, it was felt that the lack of leadership on the part of Pennsylvania's state government would doom efforts.

3. Conclusions Relative to TSSDS Use by Pennsylvania GIS Users

The most prevalent conclusion was the need for expanded education to create heightened awareness of the TSSDS spatial data standards. In order to emphasize the significance of standards and to make the TSSDS relevant to GIS users in Pennsylvania, more opportunities similar to this summit would be necessary. The participants singled out PaMAGIC as the natural conduit by which this educational process would occur. With the assistance of this organization and expanded educational opportunities, it is possible that the standards would be adopted voluntarily. In addition, this would allow the natural evolution of the TSSDS standards from militarily specific to a more state and locally focused set of standards.

An additional recommendation that generated extensive discussion was that users have the ability to adapt the TSSDS to their own needs. A suggestion was that this could be achieved through updates to TSSDS via electronic input from users or through local adaptation.

The need for increased efforts for the documentation of data was emphasized throughout the summit. Without this documentation, the sharing of data will be impossible. Opportunities to educate users about spatial data standards should also include information on metadata standards. It will be important for Pennsylvania GIS users to focus on both the adaptation of standards and the documentation of available datasets throughout the State.

4. Recommended Actions

The following actions are believed to be necessary to implement TSSDS as a core GIS standard within the Commonwealth of Pennsylvania.

Recommended Action 1: A Memorandum of Understanding be completed between the developers of the TSSDS and an entity within Pennsylvania. The goal of this effort is to 1) provide seminars to make the public, the executive, and legislative branches of Pennsylvania government aware of the wasted resources and lost opportunities that result from not having a spatial data standard, and 2) produce a requirements document for a “civilian” TSSDS.

Recommended Action 2: Based on the defined need, a “civilian” version of the TSSDS be developed and made available as a prototype. This version should avoid most military-unique references which tend to give the illusion the TSSDS does not apply to state and local government uses.

Appendix A

Agenda and Summit Materials

*Note: To be included in final report.

Appendix B

List of Participants

Appendix C

Facilitator Biographies

Appendix D

Summit Overview—Power Point Presentation

Appendix E

Presentation Materials

Appendix F

GroupSystems Output