Commentary

A Call to Action: Standards for the GIS Community

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THE NEW GIS ARRIVES. Highly touted by the literature, advertising, and benchmarks, the users expect the best. Sometimes, the promised increases in speed and power evaporate, overwhelmed by the reality of GIS in action. Meanwhile, the old system is still up to its old tricks. Attempts at data exchange turn into exercises in frustration, while file format translations become exercises in futility. Spatial data are, simply, lost in space.

One of the key problems: lack of standards. GIS has moved beyond the realm of academia and a few computer-savvy graduate students. The field is growing exponentially in terms of applications, types of users, and the number of software packages available. The groundwork must be laid now — particularly in the areas of data exchange and benchmarking — by establishing a standards committee, to ensure that GIS remains a vital and useful tool.

TREND: RAPID GROWTH

The need for standards was made evident by a recent user survey undertaken by ERDAS. The survey confirmed that GIS is attracting new users and that it is one of the most rapidly growing segments in the computer industry.

This growth seldom has an impact on hardware because, quite simply, hardware vendors have been around a lot longer than the GIS market. They established viable standards long ago, and those standards serve GIS users as admirably as they serve every other computer user. In addition, standards committees exist, enabling hardware vendors to address new technologies and changes as they emerge.

Software is a different issue. Because of GIS's relative youth in the computer industry and its current growth rate, the types of software and data available are growing exponentially. New vendors have entered the software arena. Raster, vector, and attribute data must now interact and complement each other. Data from satellites, aerial photos, and a variety of file formats must be melded into a cohesive whole — and that means standards.

The survey shows that GIS users are well aware of these changes in their industry. They see a new, increasingly complicated ball game and are demanding that someone establish the playing rules.

TREND: NEW USERS

Another trend afoot makes a move to standards even more urgent. Much of the new growth in GIS will be among new users. Analysts estimate that approximately 75 percent of the prospective market is unaware of the fact that GIS is a viable tool for their industry. These new, "generalist" users can be found in real estate and insurance offices, advertising agencies, political campaigns, and on archaeological sites.

Generalists have little patience for the intricacies of data exchange, either from one system to another or from one format to another. To the generalists, GIS is a tool to be used for problem solving and getting a job done. They want information where they need it, when they need it. For the most part, these professionals are accustomed to working on systems where information flows freely from one system to another. They will expect the same of a GIS. They don't have time to re-enter data, and they don't have a bevy of graduate students to do it for them.

Generalists are also used to being protected from the operating system through graphical user interfaces (GUIs). Fortunately, de facto standards govern these interfaces, and most GIS vendors seem to be following them as they build their own GUIs. However, care must be taken to avoid too much rigidity in a GUI. GIS, unlike word processing, spreadsheet, and CAD applications, requires tailoring to the user's environment. Vendors must, therefore, provide basic functionality that adheres to GUI standards and, simultaneously, lets the users tailor the GUI to meet their needs.

In short, generalists work in applications such as word processing and spreadsheets where standards prevail. They will demand nothing less than standards from GIS vendors.

STANDARD NEEDED: BENCHMARKS

Today's GIS users face a seemingly endless parade of new products, new versions of old products, and add-on modules for existing products. Through literature and advertising, each new software entry proclaims power and features unavailable with any other product. At best, such proclamations are based on widely divergent methods of measurement. At worst, they are based on questionable testing practices and omit information. Unfortunately, they are all the consumer has and there is, as yet, no attempt to create benchmarking standards.

Users are not, however, taken in by vendor-issued statistics. The survey indicates a distinct lack of trust in such figures. One of the most frequently cited complaints is lack of information. Rarely does a vendor provide the configuration data users need to determine how an application actually runs — how much memory is used? How is the network set up? Does the application run on a local disk?

All too often, benchmarking emphasis is on speed. To obtain a true measurement, speed tests must be run on the large files prevalent in GIS applications. In many cases, such tests are run on small files and, therefore, do not indicate performance in a production environment. And, in some instances, the documented speed may be an amalgam of speeds — scanners, printers, and other devices may contribute as much, if not more, to

the production time required as the GIS software involved.

Users also need information on how quickly a particular transaction or application is processed. Factors such as the precision of the answer and types of data that can be handled are equally important.

GIS users need a yardstick to measure the tools of the trade. The market will be best served by establishing general standards, agreed upon by users, vendors, and agencies alike, that reflect meaningful measurements.

Standards Needed: Data Exchange

According to the user survey, standards are of most concern in the area of data exchange. GIS data are constantly in transition. For example, vector data from ARC/INFO, running on a DEC computer, may be loaded into a Sun workstation running ERDAS IMAGINE. From there, it may be downloaded to a CAD or Paint package residing on a PC. Sometimes, this transfer works exactly as described; sometimes, it doesn't and the project comes to a halt. At that point, the user must write new code to accomplish each transfer, a time-consuming and expensive proposition that most would like to forego.

Three areas demand immediate attention: file format transfer, and textual information associated with image data, and spatial data transfer.

Unfortunately, little is being done to forward standards for file formatting. Most users have gone through the unpleasant experience of receiving a DLG file from a coworker, only to find that it will not run outside of the hardware and software environment in which it was developed. The problem is that many file formats, such as PostScript, are proprietary. Even with nonproprietary files, such as TIFF and DLG, each vendor's interpretation is slightly different. The results? A data file that can't be transferred, a project running behind schedule, and a very exasperated user.

Another area of concern is the textual data associated with image data. The USGS is working with a number of users and vendors, including ERDAS, ESRI, Synercom, and Intergraph to develop meta file standards to govern this text. Just as with images, users need to know the source, accuracy, and history of text, as well as how it has been manipulated.

The only standard imminent is the Spatial Data Transfer Standard (SDTS), which the USGS has submitted for approval to the National Institute of Standards and Technology. If approved, SDTS will facilitate the transfer of raster, vector, attribute, and other ancillary data. It will ensure data integrity by requiring the lineage, positional accuracy, attribute accuracy, logical consistency, and completeness of any data being transferred. The proposed standard also addressess the user's need to run on many types of media and to add new spatial data.

Another effort, spawned by the SDTS work but not as far along in the approval process, is a meta-data standard from the American Society of Testing Materials. Papers are currently available through that organization.

These efforts are a beginning. Vendors and government agencies now feedback from users on other areas where data exchange standards are warranted. A standards committee will ensure that every area of concern will be addressed.

Join the Standards Effort

As the GIS market expands, new needs will emerge that require standards. It is imperative to establish an organization to help guide GIS technology in the future, to ensure that users have a truly workable tool that solves the problems they face.

Such an organization must include vendors, government agencies, and professional organizations, such as ASPRS. Most importantly, it must include those who use GIS—both the experienced and the emerging generalist users.

The need exists; the demand exists. It is up to the GIS community to make sure that standards exist. Those interested in contributing to this effort please contact the ASPRS Headquarters at 301-493-0290.