RETHINKING DIDS: THE NEXT GENERATION OF INTERACTIVE COLOR MAPPING SYSTEMS

DAVID J. COWEN, *University of South Carolina, Columbia, South Carolina, USA*

WHEN THE Domestic Information Display System (DIDS) burst onto the scene in 1978 it was viewed by many as the ultimate solution for providing statistical data to decision makers in a form they could easily understand. This magical device was envisioned as revolutionizing the entire process of map production to the extent that no report would be complete without at least one DIDS color glossy. It received the highest level of support and publicity as an operational part of the White House Information System.

Five years later DIDS has been essentially mothballed. In September 1982, Richard Beale, the White House assistant responsible for its operation, stated that 'members did not maintain adequate levels of usage to justify the continuation of the interagency DIDS program into FY1983.' (Beale, 1982). Although some members of the mapping community may take sadistic pleasure in witnessing the demise of DIDS, the decline was due more to the fact that decision makers were not sufficiently impressed to continue to fund the system rather than its inability to generate color maps of statistical data. More importantly, it is essential that the DIDS experience be examined from the perspective of providing valuable lessons for the designers of future systems. The two-fold purpose of this paper is to describe the major shortcomings of DIDS that were identified during the two-year pilot study of a DIDS remote terminal in South Carolina, as well as to describe specific attempts at implementing a more adequate mapping system reflecting these experiences. (See Cowen, et al., 1982).

MAJOR SHORTCOMINGS OF DIDS

From the state or local government perspective it was possible to identify the following major drawbacks of the original DIDS system.

1 The centralized database made it difficult for users to incorporate data or geographical bases of local interest. The high overhead cost of the database made it desirable that all variables on the host be of national importance.
2 The hardware was too expensive for a single purpose or single user system. It was unreasonable for a local government to attempt to justify the estimated cost of about $100,000 for a remote terminal with camera system merely to generate choropleth maps.

3 The system was not part of an integrated data processing environment, therefore, it was difficult to exchange data or to separate analytical and display functions. Many data extraction or simple statistical procedures would be more appropriately carried out on a batch mode from a remote terminal.
4 The software was too restrictive in its mapping options. Choropleth and bivariate maps were not always appropriate, while zooming by square areas often resulted in the display of strange regions.
5 The color raster display technology did not support inexpensive or easily reproduced hardcopy products.
6 The menu driven operating system was cumbersome and tedious for the experienced user. While enhancing demonstrations, the user-friendly design severely retarded the system's performance for the actual users who were operators and not decision makers (Cowen, 1982).

In other words, DIDS was isolated, expensive, restrictive, inflexible, somewhat tedious and produced maps that were appropriate for only certain functions.

DIDS represented an attempt to take advantage of advancements in color raster display and microcomputer technology. In fact, the resultant system must be considered a technical success. It was truly a marvelous experience to have a local computer request a variable from a host computer four hundred miles away, and observe as it was transmitted and displayed in full color within approximately fifteen seconds. Technically there still is nothing inherently wrong with the original host and remote terminal design. Similar configurations are easily justified for presenting satellite weather images on the nightly news, however, as a system displaying chronically outdated statistical data DIDS represented an overkill.

EVOLUTION OF A MAPPING SYSTEM FOR STATISTICAL NEEDS

Any mapping system must recognize that clients have a variety of needs in terms of data, geographical bases, style and mode of output. The DIDS experiment dramatically demonstrated the results of attempting to utilize a single approach. Over the past decade the University of South Carolina has developed an integrated approach to statistical mapping that has evolved to meet a diverse set of needs. The latest step in this process has incorporated a dedicated color raster display system that builds upon the experience with the DIDS system.

The core of the system is a current and easily updated data base that resides on the University's main computer network as SAS datasets. The University's role as the official data processing arm of the State Census Data Center ensures a timely flow of the most relevant data sets into the system. SAS provides a simple to use set of procedures for accessing, selecting, manipulating and even displaying elements of this database. Contrary to the DIDS database this one is accessible from hundreds of readily available terminals. From their own offices users throughout the state can easily conduct preliminary data analysis tasks and even submit jobs to generate maps. Geographical bases can be derived from existing digital files, such as the Bureau of Census County Boundary file, or digitized from existing maps.

Although SAS/GRAPH (SAS Institute, 1981) does provide several mapping options, GIMMS (Waugh, 1978), a more flexible system, has proven valuable in meeting a more diverse set of map production needs. For example, GIMMS graduated symbol and dot maps are used for the display of absolute values. This is a substantial improvement over the misuse of DIDS choropleth maps for this purpose.

Maps serve a variety of purposes and audiences, therefore, it is essential for a mapping system to offer several output modes. In fact, it may very well have been DIDS dependence upon flashy color raster display output that most hindered its acceptance. With today's technology RGB monitors can be used to generate excellent 35 mm slides and expensive glossy color prints. Unfortunately, neither of these modes is particularly useful for producing maps for inclusion in a report that must be distributed to several readers. Thus, it is essential that a full service system include a quick but inexpensive electrostatic plotter and a high-quality pen plotter.

Multipurpose Color Display System

Nothwithstanding their severe limitations in terms of reproduction, maps generated on color CRTs are undoubtedly here to stay. They create interest and sell systems. DIDS greatly underutilized the capabilities of its color processing hardware. In addition to statistical mapping, modern color frame buffer hardware should be able to manipulate raster or grid cell data, draw plot files generated on other systems, and create drawings with computer-aided design procedures. It should be noted that the Australians (CSIRO, 1982) have incorporated several of these features in their color map system on the DIDS hardware.

The color mapping system that has been developed in South Carolina represents a cost effective, integrated, mobile and highly flexible approach to mapping. The hardware system was assembled at about a quarter of the cost of a DIDS remote terminal without sacrificing anything in terms of resolution and very little in terms of storage and color capabilities. The statistical mapping software SCIDS (South Carolina Information Display System) incorporates a user-friendly menu driven approach to variable selection, color change and determination of class intervals. Variables are easily transferred from the main University system to floppy disk. This method enables the user to actually analyze, recode and run proof plots on the main system while only employing the color system to generate the final color maps on slides, glossy prints or transparencies. Although the process may require a longer total throughput, it usually involves a minimal amount of the users' time.

Raster or grid cell datasets are easily passed to the system and then displayed with PIXDRW, a generalized pixel handling program. PIXDRW provides simple-to-use commands for color change, annotation, pan and zoom. It is a versatile system that can handle any matrix comprised of less than 481×621 cells and a maximum of 64 categories. This is an excellent system for display and feature extraction from land use or other grid cell data bases. It also provides an excellent base for development of grid modelling routines.

Often a user simply needs an attractive color slide of a map or other graphic

that has been produced on the mainframe with standard vector based software. The resultant plot files created by these programs can easily be transferred to and plotted on a color display system using graphics commands.

The latest frontier in computer mapping may well be the utilization of computer-aided design (CAD). Even inexpensive ($20,000) color frame buffer systems enable a user to create, edit, store, and retrieve map images through commands initiated from a menu on a digitizing table. As a cartographic tool the CAD features can be efficiently employed to create a polygon base map which can be embellished with elements, such as titles and legends. Polygon flooding and zooming functions provide excellent methods of digitizing boundary segments and checking for closure. These functions greatly improve the man-machine interactions that have often hindered the cartographer.

FUTURE DIRECTIONS

In the five years since the development of DIDS there has been an unprecedented combination of technological breakthroughs and market expansion of the computer graphics industry. Furthermore, the current price tag of $20–25,000 for a system very comparable to the DIDS remote terminal may well be cut in half within the next twelve months. Such improvements in price and performance strongly indicate that affordable systems can be developed. In addition, these new systems can be part of a local area network which can reside in boardrooms and private offices. Clearly the barriers of cost, inflexibility, and lack of integration that hindered DIDS can now be eliminated.

Challenge

Although it is possible to place a powerful mapping system on the desk of a decision maker there is no assurance that it will be used in the fashion cartographers would like. It is apparent that most users perceive statistical maps to be simply another form of business graphics. As such, class intervals and color schemes are most often going to be determined by system defaults and not user interaction. The challenge for software developers of the next generation will be the incorporation of an intelligent set of commands that will enable the user to quickly produce maps pleasing to the decision maker without offending the cartographers' sensibilities.

REFERENCES

BEALE, R. 1982. Memorandum to the DIDS User Community, Sept. 3, Executive Office of the President, Washington, DC.

COWEN, D.J. 1982. *Evaluation of a DIDS remote terminal in a state government environment: results of the South Carolina pilot project*, SBS Lab, U.S.C., Columbia, S.C.

COWEN, D.J., OPPENHEIMER, P. and ROUSE, R. 1982. Interfacing DIDS for state government applications: *Proceedings of Auto-Carto* V, ASP-ACSM, Falls Church, VA, pp. 223–230.

CSIRO DIVISION OF COMPUTING RESEARCH 1982. *Users' guide for COLOURMAP on SCIRONET*, Canberra, Australia.

SAS INSTITUTE 1981. *SAS/GRAPH* Users' Guide, SAS Institute, Cary, NC.

WAUGH, T.C. 1978. *GIMMS reference manual*, University of Edinburgh, Edinburgh.