cartography bulletin board

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Several cartography labs have started to use multimedia techniques for the communication and display of cartographic information. In this issue of ***Cartographic Perspectives*** the *Cartography Bulletin Board* features multimedia activities at two universities and provides an overview and assessment of two authoring programs used for multimedia development.

Multimedia Cartography at the University of Wisconsin-Milwaukee

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For the past four years the Department of Geography at the University of Wisconsin-Milwaukee has been engaged in multimedia cartography research projects. One project, that is in the final stages of production, is a level three interactive videodisc on cartography funded by the United States Department of Education, College and Library Technology and Cooperation Grants Program. The videodisc features over 700 maps and images from the internationally renowned American Geographical Society Collection at the University of Wisconsin-Milwaukee. The maps date back as far as the 12th century and represent a diverse range of map subjects, printing techniques, regions, scales, temporality, and mapping practices. Each map is represented on the videodisc with a set of images that include the whole map image, systematic tiled enlargements, and selected close-ups that highlight specific features on that map. An extensive database includes information for each map such as the method of execution, latitudinal and longitudinal extent of the mapped area, cartographic themes, comments, etc. The interface for the database allows the user to search specific database items or browse through the images on the videodisc. The videodisc also has over 20 minutes of motion video illustrating select concepts of map creation and use; and a short documentary on the creation of the videodisc and how to use it. The disc is scheduled for distribution in the Spring of 1995.

The department has also received a grant from the National Endowment for the Humanities, Division of Research Programs to create an *Archive of North American Indian Maps*. The goal of this project is to develop a research oriented visual digital database of North American Indian and Inuit Maps on a CD-ROM. This CD-ROM will contain Native American and Inuit maps, plus descriptions and catalog information about the maps (see articles by Andrews [page31-36] and Tilton [26-30] in this issue). The maps and text will be digital and linked through a hypermedia interface. This archival database is intended to function as a research tool for scholars studying the cartography, landscape perceptions, cognition, art, and history of Native Americans; as well as serving as a curatorial tool. The project grant runs from July 1993 to December 1994. CD-ROM distribution is anticipated in early 1995. ❑

Multimedia at Penn State

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Until about 1990, Deasy GeoGraphics, like many other university cartography laboratories, relied on photomechanical methods to produce thematic maps, graphs, and diagrams for the print medium. PostScript-based, computer-assisted methods have all but supplanted the traditional technologies since then. But the computerization of cartographic practice has affected more than just how we design and produce conventional products. Computerization and networking have made animated and interactive products feasible, while the high profile of "multimedia" and "the information highway" in the popular press is changing clients' expectations of our products and services. Cartography is becoming a multimedia enterprise.

We are happy to accept Jim Anderson's invitation to report on the status of multimedia at Deasy GeoGraphics. To avoid the confusion inherent in the term "multimedia," we will refer specifically to two types of newer products that are not based in the print medium: computer animations and interactive software for instructional presentations or data visualization.

Our initial experiments in animation included the diffusion of AIDS in Ohio and Pennsylvania produced in collaboration with geographer Peter Gould, and a paleo ocean circulation demonstration for Penn State's Earth System Science Center. Design issues confronted in these and other projects were explored in a seminar on cartographic animation supervised by Alan MacEachren, which resulted in a videotape called *Elementary Approaches to*

Cartographic Animation. These experiments were beneficial in developing both theoretical and practical expertise in animation, but two years passed before we were called upon to apply our abilities in a professional project. Then in 1993, several Deasy staff members consulted with GeoSystems, the mapping unit of R.R. Donnelley and Sons Company, in the design of 30 animated thematic maps for the *New Grolier Multimedia Encyclopedia* (see the article by DiBiase on pages 3-7, 19 in this issue). At present we regularly produce animated resources for a multimedia supplement to a new textbook on Earth System Science (described below).

It is a very big step from developing computer animations that users can watch to developing interactive software that users can control. Despite its non-geographic subject matter, our first interactive multimedia authoring project was an ideal learning vehicle: in 1992, a faculty member of Penn State's Recreational Studies Department commissioned Deasy to produce a multimedia "kiosk" display for their new Professional Golf Course Management Program. The kiosk was intended for use at professional conferences of golf course administrators to recruit sponsors for student internships. John Krygier developed the application in Macromedia's DIRECTOR software to run on a Macintosh computer. The application consists of a series of still images (young, well-groomed golfers smiling on luxuriant greens) and QUICKTIME movies (model simulations of ideal golf swings) intended to capture the attention of passing conference attendees. Users navigate by mouse click or key stroke thorough a sequence of text and images that explain the Golf Course Management Program. At the conclusion of the display the viewer is presented with an electronic form by which users can register as a prospective sponsor.

As the result of another MacEachren seminar (this one on cartographic visualization) Deasy staff (principally Catherine Reeves and David DiBiase) developed a map interface called SLCViewer for exploratory analysis of multivariate global climate model data by Earth System scientists. SLCViewer was programmed in a language called IDL for use on UNIX workstations. The interface allows analysts to superimpose three or more spatial data variables over one or four planimetric maps, and facilitates experimentation with data classification and graphic symbolization options.

In 1993, a team of developers including Deasy GeoGraphics staff (John Krygier, Jason Cupp, and Catherine Reeves) and Penn State instructional designer Tim Robinson began work on a multimedia supplement to a new textbook on Earth System Science entitled *Gaia-The Earth System*. The multimedia supplement is intended for use by course instructors in classroom presentations (using computer projection technology) and will be available to students in campus computer labs. The development team is busy adapting concepts and illustrations appearing in the text into approximately 275 discrete multimedia "resources." Resource types include static images and tables, animations (such as a three-dimensional model of Earth whose surface appears to warm more in lower latitudes than higher ones due to the geometry of Earth-Sun relations), sequential resources that allow instructors to unravel complex topics by stepping through a series of displays that are built-up element by element (for example, a sequence of graphs and diagrams that identifies and finally combines the several physical processes that account for mid- latitude atmospheric circulation), hierarchically- nested resources containing embedded information that can be revealed by clicking a contextually-linked area of the screen (such as a geologic time scale in which epochs are nested within periods, which are nested within eras, which are nested within eons), and interactive models that produce graphic or numeric solutions, according to the rules of an underlying algorithm, in response to the user's manipulation of a display (Imagine, for example, a generic system diagram in which the two components are represented as a framed bar graphs. Attached to each component is a slider. Dragging a slider perturbs the component. If the system is specified as a negative feedback loop, the system responds by returning to equilibrium, a process that looks like oscillating pistons gradually coming to rest).

The resources are accessed through an interface that makes it easy for an instructor or student to create and modify a custom menu of the resources required for a particular lecture. This custom menu appears in the menubar of all resources, permitting instructors to move easily from one resource to another in any order. The interface and resources are being developed with Macromedia DIRECTOR 4.0 (see overview that follows) in combination with 3-D modeling (Strata STUDIO PRO), 2-D illustration (Aldus FREEHAND), and various mapping software programs.

How else to conclude such a report but to speculate about the future? At present, approximately one-third of the Deasy staff is engaged in multimedia development. We expect the Gaia courseware project to continue for another year or two. After that, who knows? Perhaps, as Colin McEnroe of the Hartford Courant wrote recently in a syndicated

column, ". . . in 10 years or so, interactivity is going to be like disco. We'll be wondering why we did it so much." But we doubt it. With the quality and quantity of undergraduate university education perennially under fire, instructional multimedia is likely to continue to be in demand, if only to provide administrators with tangible evidence that they are doing something. And hard-pressed public universities competing for student credit hours will rely more and more on multimedia to expand distance education programs. From our perspective, multimedia has excellent potential to be a viable, revenue-producing service that allows us to apply our expertise in geographic information design in projects that enrich higher education. ❑

Macromedia DIRECTOR 4.0
An Overview

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Macromedia DIRECTOR 4.0 is a multimedia development tool available for the Macintosh and Windows environments. DIRECTOR facilitates the integration of a range of media (graphics, video [QUICKTIME format], sound, etc.) and the construction and "scripting" of interactive "movies." DIRECTOR movies can be created, saved, and played as uneditable "projectors" on both Macintosh or Windows platforms. DIRECTOR projectors can be distributed free of roylaties to Macromedia and do not require DIRECTOR software to play. The overview provided here is meant to give a basic introduction to DIRECTOR and to some of its capabilities.

The DIRECTOR interface is based upon a movie metaphor. A "cast" window collects all the diverse elements used in a movie. These elements include paint objects (bitmapped PICT graphics or images), text objects, QUICKTIME movies, color palettes (2, 4, 8, or 24 bit color), sounds, and scripts (programs written in DIRECTOR's object oriented language "Lingo" that control objects in the movie). Many of these cast elements can be created or edited within DIRECTOR.

Paint objects can be created and edited in DIRECTOR's moderately sophisticated paint window. The paint window contains tools and functions common to most bitmapped paint programs: tools for drawing shapes and lines, creating bitmapped text, color swaps, gradients, object manipulation, etc. Paint objects can also be imported from other software packages. For example, Aldus FREEHAND can be used to create maps and graphs and a screen capture utility can be used to create a PICT file. This can in turn be imported into and modified in the paint window. Text objects can be created and edited; their font, style, color and size modified in the text editing window. Color palettes can be created or customized in the color palette window (eight different modifiable palettes are built into DIRECTOR, including Macintosh and Windows system palettes and NTSC-safe colors). Lingo scripts can be written and modified in a scripting window that has full search and replace capabilities as well as automatic compilation and scripting debugger. Sounds and QUICKTIME movies can be imported, used, and played (but not edited) in DIRECTOR.

The action (an animation, interactive graph, etc.) in a DIRECTOR movie takes place on the "stage"–the screen of your computer monitor. The "score" window organizes the various cast members that appear on the stage as well as their associated effects and Lingo scripting. The temporal dimension of the score window (running left to right) consists of a series of "frames" each representing one (modifiable) unit of time. Each frame column in a DIRECTOR movie (running up/down) contains information concerning timing (tempo in frames-per-second, timed waits, wait for mouse-click, wait for QUICKTIME movie to finish, etc.), color palette used, transition between the current frame and the next frame (52 built-in transitions are available), two sound channels, Lingo scripting for the frame (e.g., pause, wait for the mouse click, then beep and play a QUICKTIME movie), and 48 "channels" for paint, text, and QUICKTIME objects (e.g., you can have up to 48 different objects on the stage in any one frame). To animate a moving circle, for example, you would place a round paint object in the first frame, then place the same object in the second frame offset to the right an inch, then place the same object in the third frame offset another inch, etc. Transitions and timing can be set for each frame. The final frame could have a short Lingo script which tells the movie to go to the beginning of the sequence and play it again, thus creating a movie loop.

While DIRECTOR provides a means for creating animations, its real power is in creating interactive movies via the "Lingo" scripting language. Lingo is a relatively sophisticated object-oriented programming language that is a combination of HyperCard's "HyperTalk" and C++. Lingo scripts can be located in different places in a DIRECTOR movie: in the movie script, in the cast script, in a particular instance of a cast member, and in a frame script. The "movie script" contains various global scripts, such as a command to install a customized