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Using the WWW to Expose Students to Spatial Decision Support Technologies

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Many information systems business faculty members find their information infrastructure constantly under stress to support the newest generation of software. This paper outlines three approaches to exposing students to a new decision support technology (geographic information systems) that utilizes the World Wide Web (WWW). These three approaches allow a range of demonstration, downloading, and interactive participation to support local facility limitations or teaching objectives.

Unfortunately, we often are faced with a "show it all or show nothing" decision when faced with trying to integrate new technologies into our teaching. In addition to resources such as videos and canned demos, the WWW provides a rich source for information about new technologies but must be used with caution. While many commercial information technology and software vendors provide elements in their web sites that are educational, one isn't always sure how to frame the materials or what are effective ways to incorporate them into the classroom. This paper describes three approaches to exposing students to geographic information technologies that focus on how this technology is applied to business problems.

In addition to supporting demonstrations, interactive in-class activities, and student self-directed activities about geographic technologies, these activities can be used to illustrate important general issues in IS/IT:

- IS management (e.g., where does data come from for geocoding, how can this technology work in a decision support system);
- interactions with users and potential biases (e.g., who controls what information is displayed, the power of visualization); and
- electronic commerce (e.g., use of interactive mapping by commercial WWW sites).

The more you know about this technology, the more ways you will find to use WWW resources for multiple purposes. However, this paper provides suggestions that those with less knowledge about geographic information systems (GIS) can use to make ties to common IS course material.

Spatial decision support technologies have become important to business in the last decade. These DSS incorporate the capabilities of geographic technologies to capture, analyze, and present management issues that relate to location in space, allocation of resources across space and time, and how geography affects the behavior of customers and competitors. Household names that are using geographic technologies include:

- Sears uses GIS to improve the likelihood that they will deliver appliances to customers within the committed four hour window;
- Starbucks uses GIS to identify new store locations; and
- Domino's Pizza uses GIS to plan the coverage of its delivery zones.

To appreciate the possible roles for this technology, students often need exposure to the role of geography in business decisions, to the power of visualization using maps, and the functions that GIS provide which other analysis tool lack. At this time, there is a shortage of teaching materials for business GIS (Murphy, 1996), and the technology can have a steep learning curve. Web based resources such as those described are stepping stones to increase the instructor's knowledge, allow refinement of instructional plans, and encourage student interactions short of the heavy investment it takes to have full GIS-based lab activities.

The activities presented here principally use materials provided by vendors to help educate their existing and prospective customers. Due to the dynamic nature of the WWW, specific sites are not discussed in this write-up since the paths may change by the time of the presentation. Also, alternate sites may emerge that are better suited for this purpose. The author will provide actual URLs at the presentation. A further complication is the uncertainty of timing of web interactions. Storing a copy of pages locally or printing examples of the sites (using a color printer) can be a wise back-up.

BG Class Activity #1 Outline: In-class "exposure" demo

This activity involves downloading a low-end desktop mapping package with limited analytical capability from the Web onto a computer before class (needs about 10mb). During the class, invite the students to generate onto a spreadsheet zip codes that have some meaning (e.g., their family's home address) and compare it to another list previously created (e.g., zip codes of faculty families or student's addresses at school). Import the spreadsheet into the software and geocode the points at that time. Demo elements focus on the basics, included pan-and-zoom, adding and subtracting map layers, measuring distances, and doing a radii that captures most of the points. Discuss how geocoding works if you have time.

The software demo can be used to segue into a discussion of how firms can use this capability to solve business problems, sources of data and who in the firm are likely to be the hands-on users versus decision makers. The origins of GIS in natural resource and land use planning can be introduced to increase awareness of government as both a user of the technology and a major provider of data. Leave the students with information about where to get the software themselves and other interesting web sites to learn more about GIS.

BG Class Web Activity #2 Outline: Introducing spatial analysis

The objective of this activity is to use web resources to teach the students more about the analytical uses of GIS for business. The instructor should call attention to both the "public" uses of these tools (e.g., interactive web sites, Federal Express and GPS) and the "behind the scenes" uses (e.g., site location, fleet management). Three elements for this activity are described. Chances are that two of the three would be suitable for the typical class time.

1. What are geodemographics. Open a discussion of what we know about people by where they live. Direct the discussion to relate this to business decisions such as where to advertise, where to locate stores. This is called geodemographics. Information technologies are used to support analysis of geodemographics by allowing us to analyze our problem using terms like "next to", "is contained within", "is within a certain distance of". (There is an online web site that provides a good discussion of this topic. You can also use the Interactive web mapping sites to help students visualize how important geography is in their everyday consumer decisions.)
2. Thematic mapping. Use this online resource to compare the geographic patterns for your state. Point out two counties in your state that you know have different demographic patterns. Have the students pick the attributes (e.g., percent of home ownership vs. amount of education) and display the maps. One approach is to open two browsers and move back and forth between them (or side by side if you have a long and skinny state to show). The application allows for some variation in the choices of the quantiles. Try to find one that shows a difference in the pattern. Use this to introduce issues about the power the person who manipulates the presentation could have over decision makers. What are some options for avoiding this type of bias? How significant is this issue compared to not having spatial relationships visualized at all?
3. Site location analysis. An interactive case allows students to pick the best ATM site for a mythical bank. This can be done as a class activity, or in teams in a lab. Prior to starting the activity you may want to have the students generate ideas about what factors could influence the success of an ATM location. Having them generate a list of locations that they have seen ATMs is also helpful (e.g., airports, mini-marts, bank lobbies, parking lots, grocery stores). After the activity, the discussion could turn to the creation of a decision support system for this problem, let's say for a nationwide bank network. Where does the data come from? Why is it valuable to have the interactive visualization capability when you can create a statistical model to do the prediction without people involved? A useful comparison is the difference between bank branch locations and ATM locations.

BG Class Web Activity #3

Outline: Student activity

There are several options for self-directed activities.

1. An ambitious one is to have the students download the software used in Activity #1 and install it. This is probably best done working in teams. (Takes about 10mb.) Then the students can be directed to online yellow pages and directories to extract a list of (zip-code based) locations for firms in a geographically bounded area. A popular one with undergraduates is pizza delivery locations. Putting the list in an importable format (usually a spreadsheet), the students can geocode the locations and consider what criteria might drive the siting decisions for pizza delivery (e.g., access to cross-town roads, proximity to student housing).
2. Interactive web mapping. Have students add maps to their own web pages using one of the interactive map services. Ask them to compare two commercial sites that use web maps (e.g., Dockers and VISA) and discuss how customers might use them differently.
3. Adapt the ATM location problem to a student self-directed or team activity. It can be helpful to generate some questions for them to answer during the activity. These questions could be mechanical (what's the URL when you are doing X) and interpretational (which of the demographic characteristics seemed least useful).

[This expands and updates a story from *Business Geographics* magazine in February, 1997 into a presentation. (Used with permission of GIS World, Inc., Fort Collins, CO.) A similar version of this presentation will be made at the Business Geographics for Educators and Researchers Conference in Atlanta, GA in June. Due to the interest in this subject, it is being offered at AIS with a different title, some modification, and a change in orientation.]

Web addresses used in the presentation will be provided to the attendees and are available upon request from the author.