

The Medium is the Message: Map Use and GIS Technology

by

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There has been some re-thinking recently about what computers represent to Man. High-tech visionary Alan Kay, whose design work led to the development of the graphical user interface, states that the computer is not a tool or an instrument but a medium. He cites Marshall McLuhan's contention from almost 30 years ago that electronic technology was not merely another form of communication but was the medium of our time and reshaping and restructuring all aspects of our life.

You have perhaps recognized the famous motto of Marshall McLuhan in the title of my talk. I want to say a few words today about the ideas of McLuhan and what medium means to GIS. What limits our use of GIS's? Is GIS a medium?

McLuhan's main concern is with the pervasive effect of the medium. "All media work us over completely," he states. "They are so pervasive in their personal, political, economic, aesthetic, psychological, moral, ethical, and social consequences that they leave no part of us untouched, unaffected, unaltered" (McLuhan, 1967, p. 26). A change in the medium forces us to reconsider and reevaluate practically every thought, every action, and every institution formerly taken for granted.

According to McLuhan, some methods of communication are more pervasive than others depending upon the degree to which the medium employed reproduces the full sensory variety of the original experience. The capacity of any medium to perform in this way depends upon the environment it creates through the number of sensory channels that are called into play (Miller 1971, p.3). The larger the number of senses involved, the more conducive the environment to convey a truer message. McLuhan states that the ratio of the senses is altered by each technology. All media alter the sensory mix and result in forcing changes on the individual (McLuhan, 1967, p. 30). "Media, by altering the environment, evoke in us unique ratios of sense perceptions. The extension of any one sense above the others alters the way we think and act - the way we perceive the world" (McLuhan, 1967, p. 41).

McLuhan is particularly critical of the written word because it forced man to attend to vision at the expense of all other sensory channels. This sensory impoverishment brought about by writing was magnified all out of proportion by printing. McLuhan argues that the linear regularity of the printed page and our long-standing exposure to such a display has trained us to accept ideas only insofar as they conform to certain strict logical patterns. We have, thus, the creation of Gutenberg Man, a reference, of course, to the Gutenberg Bible and the invention of printing. Gutenberg Man, by McLuhan's account, is explicit, logical, and literal; by allowing himself to become overdisciplined by the closely ranked regiments of text, he has closed his mind to the wider possibilities of imaginative expression (Miller 1971, p.5).

Let me demonstrate the extent to which we are conditioned by text - how you are all Gutenberg Man. On this overhead, I have words that are written with different colored pens. I will point to each word and I want you to say out loud the color that was used to write the word. Notice how you could not help but read the word. You are Gutenberg Man.

There are variants to Gutenberg Man. For example, I notice a difference between individuals who use a Macintosh vs. those that use the more common MS-DOS microcomputers. The command-line oriented structure of the MS-DOS operating system is a more text-based interface and attracts a certain type of user. On the other hand, some people learn how to use the Macintosh without reading the manual. It's not that the Macintosh user is not a Gutenberg Man - he is perhaps just less of one.

McLuhan also states that literate Man is visually incompetent because he has been so conditioned by the recognition of printed text. The study of illiterate people has shown that they have a very high degree of visual competence within the area of prescribed social interests. The TEWA indians of New Mexico, for example, have distinct names for a very large variety of coniferous trees. So many, in fact, that it is beyond the capability of white man to visually see the differences. This visual ineptness of western Man may also be a reason why many are incapable of using maps.

McLuhan contends that we live in a rear-view mirror society. He states that all new forms of media take their initial content from what preceded them. Not only is the new medium based upon the old, but society dictates that the only acceptable way of approaching the new medium is by emulating the old - through the rear-view mirror.

Another major concept introduced by McLuhan was that of the 'Global Village.' He contends that the vast network of electrical communications that now links the distant corners of the earth has created a collective analogue of the individual brain. Instead of cogitating in the solitude they once created for themselves under the influence of print, Man can now think together through the permissive medium of a synthetic nervous system that surrounds the globe.

Above all, McLuhan has forced us to recognize the way in which technical innovation, creates psychological environments, environments to which we subordinate ourselves without clearly recognizing the price we pay in doing so (Miller 1971, p. 8). Thus, his famous motto - the medium is the message. And although, of course, it is an exaggeration to claim that the medium is the message, the medium does exert an effect over and above that which is carried in the message itself. According to McLuhan, we have subordinated ourselves to printed text. Electronic communications frees us from the constraints of this medium.

II. The Printed Map and GIS

Now that you have been McLuhanized, let us turn our attention to GIS and, in particular, the primary source material for GIS's - the printed map. Even in the era of GPS, maps remain the primary source material for the creation of GIS's and will always be a primary method of display. The question we should ask, however, is to what extent maps suffer from the same limitations as text? Have maps closed our minds to the wider possibilities of imaginative expression and communication about the spatial world?

In the thousands of years since the first map was made and especially in the

last 500 years or so since the first map was printed, maps have evolved within the limitations of the paper medium. The way that we have come to depict information about the world around us as maps - the symbols, the method of generalization - is a result of the paper medium. Today, every map, even those made by computer, embody the limitations of the paper medium. Our thinking is still in a 'paper-age.'

III. GIS: Tool or Medium

GISs have, with few exceptions, simply emulated manual methods of map use and analysis. We have approached GIS through the rear-view mirror. The computer has not been used to do something fundamentally different but to simply automate what we have always done. Because of this, GISs are only a tool, an instrument to automate age-old methods of map analysis and map construction.

The technology of GIS makes it possible to conceive of new and more informative methods of analyzing and displaying information about the world. GISs make interactive map use feasible and offer the possibility to display dynamic processes. With the introduction of software that creates map animations, cartographers are questioning the viability of the single map. The ability to view a distribution in a variety of ways and within an historical or geographic sequence provides a more comprehensive view of the world. We will perhaps one day wonder how we could have ever thought that one single map served much of a useful purpose.

GIS technology can change the relationship between Man and the environment - both human and physical. In order to accomplish this, we need to go beyond the limitations of the printed map and the embodiment of these limitations within GISs. We also need to make the technology more available. At present, GIS technology is for the few, like you. The technology does not reach a large enough audience, and that's a shame because it can change the way Man views, understands and interacts with the environment. The technology must reach a larger audience. GISs have to become less complicated and smaller. Considering improvements in the

user interface that accompanied the development of microcomputers, creating even smaller computers may be all that is necessary. How small are computers getting these days?

IV. Stylus-based Computers

The recently introduced GO computer and associated PenPoint operating system provides a good example of how GIS might become a medium. About the size of a photo album, the GO computer is all monitor - there is no keyboard. The LCD screen has a resolution of 100 dots per inch. The computer has 8 megabytes of memory.

The PenPoint operating system is based on a stylus interface and is specially designed to interpret handwriting. For the processing of commands and text input, the operating system incorporates the recognition of meaningful gestures such as a caret for insert, cross-out for delete, square-bracket for block-marking and a question mark for help.

The GO computer and others from companies such as GRID, Canon and SONY are the beginning of what are called stylus systems. It represents a major advance in computer interface. As advanced as these new computers are, they are only the precursors of a whole new generation of computers. What might the future stylus-type system look like?

Let us call such a computer a 'Superboard.' It would be a relatively flat computer, perhaps 2 inches (5 cm) thick with a large screen of 17 x 12 inches (42 x 30 cm). The Superboard would have to be as portable as a larger book or atlas. The screen resolution might be as much as 300 dots/inch (120 per cm). With such a screen size and resolution, the number of displayable points would be approximately 5000 x 3500 (actual 4960 x 3543) for a total of over 17 million (17,573,280). The use of the Superboard would not be limited to the display and analysis of spatial information but it would also be capable of Hypermedia presentations of sound, picture and text. It would therefore make the interactive use of newspapers and books

possible. *Map use overheads*

It is interesting to examine some of the memory requirements of the Superboard as presented here. For example, over 2mb of memory would be required to simply display a black and white image on the screen ($4960 \times 3543 = 17573280$ bits/ $8 = 2196660$ bytes/ or 2.0948982239 mb). With the memory now available in microcomputers, this is not an excessive amount. In fact, the cost of a 1mb chip is between \$50 to \$100. A grey scale or limited color image would require over 17mb. A true-color image would require over 51 mb. Although these seem like unlikely amounts, the trend is certainly toward cheaper memory chips and microcomputers with large amounts of memory. In terms of long-term storage, current CD-ROM drives store approximately 650 mb. We all realize that with technological developments, 650 mb is by no means an upper limit. Memory requirements do not seem to be a major obstacle to the development of the Superboard. By the mid-1990's such a Superboard will be much more of a reality.

V. Conclusion

The GIS revolution hasn't happened yet. For one thing, we are still simulating paper. The way we think, the way we use the computer is still constrained by the previous medium. Secondly, GIS systems are the ultimate in elitism - not only are they too large and expensive but they are needlessly complex. Developments with stylus-based computers systems will likely change this and introduce a new complexion on GIS's and the way people think of space.

References:

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