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A Survey of Customer Reaction**

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Rex C. Buchanan

October 2, 1996

Open File Report #96-42

Kansas Geological Survey
Open-file Report

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ON-DEMAND MAP PUBLICATION: A SURVEY OF CUSTOMER REACTION

Rex Buchanan

Kansas Geological Survey

presented at the annual meeting of the Association of Earth Science Editors, Sudbury, Ontario, 24 September 1996

The Kansas Geological Survey has not printed a map, by traditional printing methods, since 1983. We continue to sell maps that were produced by traditional printing methods, mostly those that come bundled with an existing publication or maps that we have kept in inventory for some time. Since 1988, however, the Kansas Geological Survey has been producing and selling on-demand versions of its thematic maps (Buchanan and Steeples, 1990). While we have produced those maps for eight years, we have never formally asked our customers and clients their opinion of the results of on-demand technology. We have routinely received anecdotal opinions, and formed our own opinions about print-on-demand, but for the most part we have made decisions by the seat of our pants.

By deciding to go to on-demand printing of maps, we made a major change in the way we provide information to customers. We made that decision because we thought it was in our best interest in terms of turnaround time (we can produce the computer-plotted maps much more quickly), in terms of the quality of the information (we can correct any mistakes immediately), in terms of the variety of information (we can make available maps that would have been uneconomic to print), and in terms of cost of storing inventory. We assumed that our customers would agree that turnaround, quality of information, and variety of maps were also important to them. It was substantially more costly to produce individual copies of a map (though our total costs were probably less because we didn't have to pay for a large print run), and we had to raise prices to compensate for that. We assumed our customers would think those price increases were worth it. But we didn't know.

There is relatively little published, public literature concerning customer response to on-demand publication of maps, in particular, and on-demand publishing in general. There have been surveys of customer

preferences in map projections (see Werner, 1993) and color (Mersey, 1990) in traditional maps. There was a survey of customers of the U.S. Geological Survey's hydrologic atlases (Dymon, 1989), again a traditionally published map series. The U.S. Geological Survey itself studied its customer preference concerning GIS data sets (Gillespie and Snyder, 1995). Still, little literature speaks directly to the issue of customer reaction to on-demand map production.

In this paper, I will discuss a small but formal survey of the customers for our computer-plotted maps. I wanted to know what our customers thought about maps that were plotted on demand: whether they preferred the new technology to traditional printing methods, or if they even noticed the difference. I wanted to know if they thought the improvements in turnaround time and variety of maps were worth what we perceived as changes in quality and the increased prices associated with producing the maps from the plotter. I wanted to know what they liked and didn't like about our maps, and where they would suggest improvements.

Let me begin by describing the maps themselves. Most of the thematic maps that we sell are related, in some fashion or another, to oil and natural gas, water, or basic geology. These maps are produced using in-house software called GIMMAP; most of our research staff now uses ARC/INFO. The maps are generated from a 44-inch Calcomp electrostatic plotter that has a resolution of 400 dots per inch. Other units in the Survey are using Hewlett-Packard inkjet color printers of a slightly smaller format; because of the quality of their output and the paper they can use, we may go that direction in the near future.

I surveyed customers who bought maps from the Kansas Geological Survey during August and early September, 1996. We gave customers a questionnaire at the time they bought maps--either in person or through the mail. The questionnaire consisted of two pages, the first asking for a small amount of demographic information, but mostly requesting information about how customers learned about and purchased our maps. The second page asked them to rate the quality of the maps themselves (not the quality of the information contained on the map), asked if they preferred plotted versus printed maps, asked what they thought about our pricing, and finally asked for any other comments or suggestions. Most of

the responses to the questionnaire were based on purchases of geologic maps (Arbogast and Johnson, 1995, and Ross, 1991), maps of oil and gas producing horizons (Carr et al., 1994), or a series of groundwater maps (Yoder et al., 1995).

Of the questionnaires distributed, a total of 28 were returned. To increase the response rate, in nine cases I followed up a purchase with a phone call, asking for the same information by phone interview. Even so, the total number of responses here is dangerously low. This is not a sample size that I am comfortable with, and before giving you the results, I want to caution you to keep in mind that the sample size is low, and that I recognize it. We know a little more than we did, but I think we should be careful about making generalizations from a sample this small.

The customers who responded tended to divide themselves somewhat along the same lines noted in previous surveys (Dymon, 1989). That is, the customers for our thematic maps tend to be highly technical specialists, such as geologists working for petroleum companies, somewhat less technically informed users, such as managers of groundwater management districts, and even more general users or members of the general public, who are often most interested in geologic maps.

Here's what they said. For the most part, our customers believe that the quality of our maps is relatively high. I asked them to rate the maps' overall appearance, paper quality, type, and colors on a scale of one to five, with five connoting high quality and one connoting low quality. With 28 responses, our customers rated the maps' overall appearance a 4.25. From the phone conversations I had, it was clear that clients recognized that they were buying computer-plotted maps, and were very satisfied with the overall quality. They rated paper quality a 3.70. Paper quality has long been an issue in our on-demand publication process. Our electrostatic plotter uses paper that is relatively thin, fragile, and doesn't seem, to me at least, to hold up well with heavy use. Our customers apparently recognize that, and several made additional comments about paper quality, but they don't seem overly concerned. They rated the type, or lettering, on the map a 4.21, the highest of any category, and they rated the colors on the map, in terms of evenness and appropriateness, a 4.16. Several made comments about the unevenness of the colors, something we were aware of, and others requested more vivid differences in neighboring

blocks of color on a specific oil and gas map. Because of the small sample size, these variances probably aren't statistically significant, but they are instructive.

All of these numbers agree fairly closely with results obtained of a previous study of U.S.G.S. hydrologic atlases, when customers were asked to rate maps on a scale of 1-5 for how effectively they provided the data customers wanted (Dymon, 1989). In that study, the average rating was a 4. At the same time, less technically inclined customers expressed concern about missing content, and the study's author was surprised that, in light of customer concerns, they gave the maps such high numerical ratings. It may be that most people are more comfortable giving products high marks. However, I think we can assume that our customers are generally happy with our maps, but they recognize problems with color and paper.

Of the respondents, about 68 percent said they preferred computer-plotted maps to traditional maps; 18% said that it depended on the situation; and 14% said they preferred traditionally published maps. Because of the nature of the questionnaire, I was a little surprised that the 14% who preferred traditional maps was as high as it was, and if you combine those responses, 32% of our customers either prefer traditional maps, don't care, or believe the method of production depends on the map. Again, because of the sample size, it's difficult to read too much significance into that figure. But the comments from respondents indicated that our customers are cognizant of the pluses and minuses of computer-plotted maps, and they had some caveats for us. Primarily, they stressed the importance of up-to-date information, but wanted any computer-plotted maps to maintain their quality. In fact, several said that the method of "publication" might depend on the nature of the map itself. Thus, they clearly are aware of when computer plotters are most advantageous; they like computer-plotted maps in the case of time-sensitive information, as opposed to static information. That is, they like the idea of using computers to plot maps showing oil and gas reservoirs or groundwater level changes, for example, as opposed to something static like geology.

To cover the cost of producing these maps from the plotter, we had to increase the prices on our maps fairly substantially over a short period of time. As late as the mid-1980s, we had charged, for example, \$5.00 for

a 1:500,000 map of the state's oil and gas fields or our geologic map of the state, two of most popular products. With the conversion to on-demand plotting, we increased these prices to \$20.00, over the course of a year or so. We got some verbal and written complaints about these increases. Our assumption (again untested) is that, for the most part, many of our customers don't worry too much about prices. Particularly in the world of thematic maps, they want the information and they are willing to pay for it; a few dollars one way or another doesn't matter that much to them.

If you can believe what the respondents say, that seems to have been borne out by this survey. Eighty-two percent of the respondents said our maps were priced about right or priced less than they should be. Eleven percent said they were too expensive. The comments revealed the same reaction. They said the information was valuable enough that the increased prices were worth it, our prices were cheaper than most private sources of maps, and (and this is a consideration that is especially important now) they cost considerably less than it would cost a company or individual to make those maps themselves. Given the capabilities many companies now have, they could do that if they wanted.

Which takes me to the final question asking for comments or suggestions. For the most part, our customers had positive comments about our maps and said they were useful and understandable. If they had a primary concern, it was, not too surprisingly, about access to the digital data used to create the maps, that they be able to get it, and that they get it in formats that are most useful.

Where does that leave us? Keeping in mind the small sample size, I think we learned that our customers are generally very satisfied with our map products, that they have some concerns about certain qualities of the maps, but for the most part they are willing to overlook what they perceive to be small problems in order to get the information. And they don't mind paying our prices. All of this is about what I expected. I'm not sure there's anything too shocking in any of this.

So why do it? I can give you a three reasons. When I was preparing this talk, I spoke with a couple of people at the U.S.G.S. who are involved with the process of on-demand map publication. In what I would regard as an extremely enlightened step (and one that I think they've avoided in the past when making decisions about topographic mapping), they are

doing surveys and focus group research with customers to find out what they like and don't like about on-demand map production (Michael McDermott, personal communication, 1996, and Cynthia Cluck, personal communication, 1996). But that is rare. In spite of the fact that many of us appear to be headed that direction, now that we commonly have the computer capability, we know very little about how our customers are going to react. We might think we know, and sometimes we make good guesses, but generally we're making decisions without customer input. The only way to get valid information is to do what amounts to market research.

Second, once the decision to produce on-demand maps is made, customers still have highly useful suggestions for changes, once they've seen the products. I think we were aware of most of the issues that our customers raised in the survey, but we weren't aware of all of them, nor had we always accurately gauged their level of concern, either positively or negatively.

A final reason, and one that I hadn't really considered until I was in the middle of telephone interviews, was that our customers generally seemed to appreciate being asked their opinion. Obviously I couldn't get that reaction from the mailed-in responses, but when I talked with customers on the phone, it was clear that they liked having input, that they appreciated somebody asking about their thoughts. Even where we couldn't or wouldn't change the way we did things they didn't like, they liked the fact that somebody was listening to them. While I had difficulty getting as many mailed-in responses as I would have liked, I had no problems getting answers to the same questions by phone. Simply asking them their opinion seemed important to them. In fact, virtually all of the people I interviewed on the phone took the opportunity to tell me about other concerns, questions, or issues they had about the Kansas Geological Survey, something I hadn't anticipated.

It may be a truism that we need to worry about our audiences, but I'm not sure how many of us, certainly at governmental agencies or universities, actually do that. I know Bev Vogt has been active in gathering information from her customers in Oregon, but I don't know if the rest of us have. I think that's to our detriment. As we make decisions that affect our customers, and I think this is especially true of governmental agencies,

we need to make those decisions with as much carefully researched information as we can obtain. We're all in the process of making "publishing" decisions related to information available over electronic networks. While Web pages give us the ability to see how many people use our home pages and give us some sense of who those people are, they don't tell us everything we need to know about that audience, and they certainly don't tell us anything about our customers out there who don't use the Web. As we make decisions about disseminating all sorts of information--not just maps, but data and journals--it would behoove us to know our customers and what they want, not make decisions that we simply believe are in their best interest.

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