

Closing Session

Open Discussion--Whither by 1984?

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Thompson: The title of this open discussion, "Whither by 1984?," was selected by the conference planners. When I saw the title I wasn't quite sure whether they meant what will happen 10 yr from 1974, or whether they specifically had in mind the magic year 1984 as presented in George Orwell's book 1984. I read the book in 1949 when it was first published, and it made quite an impression on me--I still remember it. However, I did get a paperback edition (I think the 27th) to refresh my memory. You may remember that Orwell was predicting a social system 35 yr in the future. In 1949, 1984 seemed very far in the future, but it is not such a long time now. I thought that it would be interesting to relate Orwell's predictions to cartography in 1984.

I have composed a credo for cartography in 1984 (fig. 1) based on Orwell's credo for ENGSOC (English socialism in 1984)--"Freedom is slavery, Ignorance is strength, War is peace." After listening to the proceedings of the first 2 days, I think that the cartographer's slogans for 1984 will be: Manual is slavery, Digital is strength, Automation is peace. The overriding slogan of 1984, "Big Brother is watching you," can apply equally well to Orwell's society and cartography. Although it is not yet 1984, you can go into any department store in this area during the Christmas season and Big Brother will be watching you through television. Before very long we will have the two-way television screen in our homes with Big Brother watching us. We are approaching this stage in cartography with interactive systems that can operate in both directions.

In 1984 will I have one of Boyle's floppy cartographic disks to carry with me on trips instead of a road map? What will happen in 1984?

Boyle (Univ. of Saskatchewan): I have been thinking about 1984 because if you want to design something for next year, you design it for 10 yr in advance; it takes that long to develop it. We do a lot of bibliography searches. Extracts from different reporting systems come to us every month. Since I never have time to look at them, they gradually pile up and are thrown in the waste-paper basket. I keep asking for magnetic tape. We could put the tape on our system, find out what we want, and then ask for it. But they don't know how they would be paid for it, and they think we might copy the tapes--a nonsense situation. In 10 yr many people will use geographic information systems, and they will expect to get cartographic data on magnetic tape. Supplying tapes will be routine then, whereas now it is exceptional. Whether we will still have the drawn map in 1984 is debatable.

1984 ORWELL

- Freedom is slavery
- Ignorance is strength
- War is peace

1984 CARTOGRAPHY

- Manual is slavery
- Digital is strength
- Automation is peace

BOOK REVIEW

Figure 1

Fetter (Southern Illinois Univ.): A few years ago Dr. Gil Hollingsworth, then head of the Boeing Scientific Research Laboratories, described in a paper the length of time between proving a product in the laboratory and implementing it. He decided that photography would take 100 yr, solid state 5 yr, and so on, with everything converging about 1984.

Yesterday somebody said that information must be in a form that local people can understand, and today somebody said that we must reach the sublocal people. Perhaps we have all the systems necessary to bring this information to the individual in a form that he can use. The best example right now is satellite weather maps on television. While television is not an appropriate medium for cartographic precision, it should not be discounted as a means for conveying information. With increased awareness of natural resources individual decisions have big impacts. Perhaps now it would be helpful to have a map on television that showed contours indicating areas of equal prices for sugar.

The wide-angle projection system at Boeing began as an idea for displaying global data without distortion in a compact airborne space. The idea was very much like a planetarium, with a display on the inside surface of a sphere. We built a program that acted like a fish-eye lens. At Southern Illinois University, I am studying this system again because I am beginning to see applications far beyond global display. We have made a 70-mm test slide, which earlier this year I placed in the Boeing Spacearium setup. It worked beautifully. Our next step is to write a proposal for 70-mm film so that we can display not only a hemisphere of the Earth, but also motion in order to see changes in Earth resources or other themes.

Being immersed in an environment, rather than just seeing a small section of it, has several advantages: your whole body--kinematics--helps you to interpret distances and spaces, and the focal distances are identical to each point on the surface. This type of display will be useful for air-traffic display and three-dimensional displays such as the geographic horizons of interest to oil companies.

We are also studying virtual image use of digitized matter. We have a prototype synholizer designed by Roger De Montabello. We hope to demonstrate how geographic data can be placed in this three-dimensional region so that you can walk around and see it; even though it doesn't exist in three-dimension, it appears to. It is technologically at a lower level than holography. We think that both of these developments, particularly when combined, will offer some interesting opportunities.

Aangeenbrug (U.S. Bureau of Census): Some years ago several Federal agencies working together completely automated the activities of several U.S. cities. This work is a well-documented failure so far, but it is also a small success. Wichita Falls, which had a reasonably good data base for some of its operations, discovered that the contract for cable TV would allow two-way communication. At an informal session the council discussed the possibility of controlling the TV and of reminding people on the TV of overdue water bills. One councilman even suggested that this might lead to manipulating the TV environment of that individual.

Also in Wichita Falls the local decisionmakers were unaware or impatient with the "right" map. To them the only right map was one that was readily available and that they could understand, regardless of the cartographic skills or the money required to produce them. One of the biggest threats or opportunities to traditional cartographers is that they must produce a

map that people will understand even though they don't quite agree with it. Cartographers shouldn't eliminate basic and serious research and development, but unless they produce these maps, someone else will. Once I showed a three-dimensional model of housing values to a Secretary, and he understood it. Jenks said that the class intervals were wrong, and Corbett and other technicians said that the colors were wrong too, but the Secretary liked it.

Ward (Central Intelligence Agency): A safe prediction for 1984 is that Murphy's Laws will continue to operate. Some of you are familiar with Murphy's Third Law--if anything can go wrong, it will--but I would like to remind you of the first two. Murphy's First Law is that nothing is as easy as it looks. His Second Law is that it always takes longer than you think.

Finnie (Private consultant): Using Murphy's first two laws, I would like to project changes for 1984 based on the changes that were supposed to take place in automated cartography from 1965 to 1974. In 1965 Radlinski and I served in the same kind of working group for the Bureau of the Budget that Southard talked about. After studying six major areas, one of which was automated cartography, our panel investigated the status of research and development for automated color separation. The equipment displayed this afternoon existed in 1962. Prototype raster scanners were to be operational in 1969. Before 1969 we were to be able to color separate maps and charts at one-tenth the 1965 cost.

After 5 mo in the working group, I returned to production and made one big mistake. Thinking that we would have to change to automated cartography in 4 or 5 yr, we contracted more work and did not recruit replacements for people who retired or changed jobs. In 2 yr I checked on the progress of the raster scanners; and the drawings and concepts were the same ones that had been explained to me in 1965. These same scanners are still in the labs. That they aren't replacing people doesn't mean that they won't, but development moves slowly. Military cartography is making progress in automation because the user needs digital data rather than analog data for maps and charts. We have plenty of examples and an enormous amount of capability to produce digital data. Anytime that you can produce digital data as an output, you can take advantage of that cost of production to automate your mapping processes. By 1984 military cartography will be more automated than civilian cartography because military requirements for digital data are increasing rapidly.

Doyle (U.S. Geological Survey): How many slaves will we have in the Geological Survey in 1984 if "manual is slavery"?

Thompson: 1742, I think.

Doyle: Digitization and automation can take place at various levels, but sooner or later in the cartographic process someone has to make decisions. The automation of those decision points is beyond our scope at this time. We may be able to replace the lower level scribes, but a top level of people will have to remain as the decisionmakers and continue to be slaves.

Colvocoresses (U.S. Geological Survey): Automation is not necessarily synonymous with digitization. The National Oceanic and Atmospheric Administration is enhancing band 7 of ERTS imagery (which was digital to start with) and making their water plate thematically--a step in the right direction cost-wise and it did not involve the digital process.

At the first meeting Radlinski presented an equation which states that map value is a function of content, completeness, clarity, and preparation time. I think that Rad has omitted a critical factor--spatial accuracy. I also think that time should be taken out of the denominator and put in the numerator. If we can agree on criteria, I am most anxious for some of our maps to be evaluated with this equation so that we can find out what we are getting for our money. The time has come to put a quantitative value on our maps to monitor our progress in this field.

Boyle: I've heard no mention of metrication. Is the U.S. converting to the metric system? If so, perhaps 1984 is a good target date.

Edson (U.S. Geological Survey): In 1984 one of the ingredients in cartography will be man's increased intellect. Man's interest in maps coupled with this heightened intellect will increase his desire for knowledge about his environment. I foresee a continuing and expanding need for the graphic as well as the digital product.

Brassel (State Univ. of N.Y.): The alternative to slavery and ignorance is education. For the next 10 yr education and training in map reading will be very important. We are able to represent facts or concepts that are very difficult to read. Most of you say that we must simplify our maps, but also we must educate people so that they can read the concepts represented.

Aangeenbrug: One of our big problems is that we are professionals worshipping at the shrine of automation. Quite often, we are perceived as casting pearls at the citizen swine. However, many decisionmakers are quite smart. We must assume that people can learn and then provide the tools and training to see that they do. We should ask rather than assume that people can read our maps.

Moritz (PRC Information Sciences Co.): I expect that the cost of digital processing will come down significantly. Nowadays a 50-cent piece of film is replacing digitizing equipment costing over \$100,000. Our biggest problem will be deciding how much data to keep and in what form. Telecommunications is going to have a great impact on the transfer and standardization of data. Information from national data banks will be made available by sending film through the mail or by using inexpensive telecommunications equipment, such as teletypewriters or small cathode-ray-tube consoles which are well within the budget of most State and local users.

Thompson: This message comes from one of our recording monitors, Madonna Elliott, who is a civil engineer in the Topographic Division of USGS. Madonna says, and I think it is appropriate, "I would like to see more women in cartography by 1984 than I have seen here this week."

Bockes (U.S. Dept. of Agriculture): In 1984 will we be able to come to USGS and get digital data just as we now get maps?

Thompson: Tomorrow morning we will give you some, if you ask for the right data.