

CHARGE TO THE CONFERENCE

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It is with pleasure that I greet you at this the opening of the Second Conference on Automation in Cartography, co-sponsored by the Bureau of the Census and the American Congress on Surveying and Mapping. Those of us associated with the first conference were pleased with the results -- both from a technical and an attendance standpoint. Certainly on the basis of your program content and speakers, Auto-Carto II should exceed the success of the December 1974 meeting. I believe that it is most appropriate that this meeting be co-hosted by the Bureau of the Census and ACSM. As a collector of such an enormous amount of data, it is important that we translate this digital data into a graphic medium as clearly and timely as possible if it is to be of value to the users of the type of information serviced by the Bureau of the Census.

I can think of the following more specific reasons for automation:

- To speed up the process of map making.
- To improve the economics of mapping.
- To generate digital data for direct dissemination, and for rapid manipulation to produce, with a minimum of effort, maps at different scales and with selected contents.
- To facilitate revision and updating of maps.
- To reduce the incidence of errors.

It seems to me that any one of the cited reasons, if valid, is sufficient to justify automation, but when combined, the case becomes overwhelming. The relative importance of these reasons will vary among map makers and users, but the order in which I have given them is my particular priority.

TO IMPROVE THE ECONOMICS OF MAPPING

In these days of spiraling costs, economy of operation is an attribute dear to everyone's heart, and a real prime mover toward implementing automated techniques. Not too many years ago, when people presented papers on the subject of automation, they avoided the cost effectiveness factor like the plague. Today, it is a different scene -- equipment effectiveness is rising with speeds ever increasing to the point where, in spite of inflation in hardware and software costs, new techniques are truly competitive. Despite continued higher costs of equipment and manpower, due largely to inflation, overall mapping costs have not risen because of increased efficiency.

A major advantage of cartographic data in digital form is the convenient interface with other geographically related information and management systems. Such interfaces provide a means for numerical data in machine-readable form to be utilized in complex modeling and problem analysis. Examples of the type of data required for various systems include: positions and elevations of manmade or natural features, transportation routes, lakes, streams, shorelines, slopes of terrain, land use, cadastral and political boundaries, population distribution, soils, geology, hydrology, and flood-prone areas. When these data are digitized, the end product can be in a variety of forms and at any scale.

It is reasonable to assume that nearly everything that is constructed by man is known at some level of government. We, therefore, must strive harder to seek ways of accessing local government data in an effort to achieve the goal of "best information for the least possible cost."

Another advantage of digital data is that it can be rapidly manipulated to produce, with a minimum of effort, maps at different scales and with selected contents. In the past, cartographers have mapped specific areas of interest at a scale commensurate with the unit in use that best satisfied the average map user requirements. As such, the level of content was, of necessity, limited by the scale selected. Past technology has also condemned the end product to be a hard copy at a single scale with limited and generalized content.

Far too often users have found it necessary to produce their own maps because of their need for specific content or particular scale. Often the scale of the general maps can be changed by use of a copy camera to the desired scale, but the content must be treated separately and manually. These analog processes are sometimes expensive and limited by optical or mechanical constraints. Today, automated techniques in cartography can be applied to develop new and different forms of presentation.

TO REDUCE THE INCIDENCE OF ERRORS

To produce an absolutely perfect map or chart must surely be every cartographer's dream. We have always accepted this dream or goal as being unattainable. Additionally, the degree of perfection or tolerable amount of error is tied closely to economics.

Automated cartographic techniques may help us on both ends -- providing a more reliable and complete product at lower cost.

While accuracy is normally limited by the inherent capability of the various machines utilized, reliability and completeness are a function of costs and human judgment.

Each phase of mapping that can be removed from the frailties of human judgment and be automated is likely to become more error free.

CONCLUSION

Summing up, the introduction of automated procedures to map making and map maintenance presents a whole array of opportunities to improve the cartographer's art. It can eliminate vast amounts of tedious work, and cut years off the time presently required to produce new maps. It can be the means for timely updating of existing maps. It can permit the cartographer to be much more responsive to the demands of map users for special content or particular scales. It can be the means for obtaining access to large amounts of existing data which are not now effectively used because under present methods of data gathering and accession, they cannot economically be assimilated in the map maker's data base. And it can do all these things faster, better, and with less cost and less chance for error than they are now being done. The use of automated techniques in cartography can be likened to "letting the genie out of the cartographic bottle" -- releasing a giant slave whose services may be utilized almost at will.

Automation in cartography is a real challenge to our creativity. The results of our creativity reflect on all fields -- social, economic, communications, planning, decision-making, and organizing our activities. These are but a few examples of the challenge to the cartographer and we can multiply these challenges many times if we were to include the full spectrum related to the need to develop energy, minerals, and food supplies for the future and to maintain the quality of our environment.

If we accept uncertainty as a part of our future, then we must pursue vigorously imaginative action in those directions in which there appears to be promising solutions. Obviously, automation in cartography is one area that we need to pursue vigorously with our creative minds. We have only touched the surface in the conversion of statistical data to map form. It is my sincere hope that we will return from this meeting with a better understanding and application of this dynamic process in cartography.

On behalf of ACSM and the U. S. Geological Survey, I hope that you have a most productive meeting, and if there is anything that I can do for you, please let me know -- I will let the Bureau of the Census speak for themselves. Thank you, and the very best to you in your meetings this week.