

BACKGROUND AND TRAINING OF GEOGRAPHICAL INFORMATION USERS: A CASE STUDY

Ute J. Dymon
Assistant Professor of Geography
Department of Geography
Kent State University
Kent, OH 44242-0001
USA

COMMISSION VI

ABSTRACT:

Increasing professional use of Geographic Information Systems (GIS) appears to require the aid of highly trained technicians for the initial implementation and sustained operation of the systems. How such systems are used and the kind of background and professional training required of the users are the focuses of this study.

A survey of two-hundred GIS users in Massachusetts, U.S.A. indicates that the majority do not possess formal training in GIS but developed the necessary skills "on the job". In addition, two groups of users are identified based on the length of their experience with GIS: the computer science experts and the planner/managers. While the majority of users are satisfied with their mastery of their respective systems, many users indicated that they needed between three to six months to become proficient in operating a GIS.

KEY WORDS: GIS User, Training, Utilization, Experts, Skill Development.

INTRODUCTION

In recent years there has been an increase in professional use of Geographical Information Systems (GIS) throughout the United States. Many planning agencies on the state, regional and local level are using GIS in their daily operations (French and Wiggins, 1990). According to Troppen (1991), this growth will continue and the rate may be increasing throughout the world. Past studies indicate that the real surge of GIS applications is still to come and that many professionals are not yet aware of what GIS can do for them (Rhind and Mounsey 1989, Masser 1988, Chorley 1988).

Currently, many Geographical Information Systems are complex and not user-friendly. They appear to require the aid of highly trained technicians for their initial implementation and sustained operation. These technicians, however, may not be able to synthesize the broader context of a given problem

because of their specialized training. This raises the question of whether or not there is a discrepancy between professional training and technical know-how when it comes to GIS users.

The focus of this study is to identify what kind of background and professional training GIS users have and how they actually use the systems. In order to investigate this problem a survey questionnaire was developed.

METHODOLOGY

The survey questionnaire was prepared and mailed to nearly 200 GIS users in Massachusetts. Most users were members

of the Massachusetts GIS user group. The questionnaire was designed to ascertain a) their professional and educational backgrounds, b) the activities users are involved with, and c) how well the systems serve them.

The Sample

Out of the mailed questionnaires 166 were completed and returned. In addition, 28 users were interviewed in person or over the telephone. These were persons referred to by other GIS users. Most of them were either new in the job or were not connected with any professional group or association. This brought the sample to 194 completed questionnaires.

BACKGROUND AND CHARACTERISTICS OF GIS USERS

The first part of the questionnaire solicited occupational information about the users including name, educational background, years involved with the use of GIS and whether or not they worked in the private or public sector.

Based on the responses, 62.5% worked in the public sector at the federal, state or local level, and 37.5% worked in the private sector including consulting, corporations and industry.

Users were asked how they got involved with GIS. The following picture emerged. The majority of users (56.8%) had computer background while the rest had (1) taken formal courses in GIS, (2) taken one or more workshops in GIS, or (3) trained themselves.

When asked how many years they were involved with GIS and how many years they were in their current positions, the shift into GIS within the job was apparent for most of the respondents.

Years Involved with GIS
Table 1

1 - 5 years	87.4%
6 - 10 years	4.8%
11 - 15 years	3.0%
16 - 20 years	4.8%

Table 1 clearly supports the rapid increase in GIS uses within the past five years. The growing demand to include GIS in the workplace is demonstrated as well. While there were hardly any GIS users in the prior 10 years, there were also only a few early starters who got involved with systems development.

Years in Current Workplace
Table 2

1 - 5 years	44.6%
6 - 10 years	31.6%
11 - 15 years	13.8%
16 - 20 years	10.3%

While Table 1 supports the rapid increase in GIS uses, Table 2 suggests that there are two kinds of GIS users within companies. Either persons train and learn how to use GISs as computer experts or they get involved because of specific projects. Clearly, these are people who benefit from workshops and courses offered in GIS to advance their skills. The other fifty percent however, fill newly-established GIS positions: these persons have either computer background or formal training in GIS, and are users who benefit from the growing market in GIS.

Thus, two user groups emerge from analysis of the background and characteristics data: those with a computer science focus and those with a planner/manager approach. One group of new, more recently hired users has expertise rooted in their training in computer science. In contrast, a second user group has more general education and experience in planning and management. These planner/managers bring to GIS use a rich set of mental models for wide application of geographic concepts. They are people who acquired GIS skills to be able to apply GIS as a tool.

THE SYSTEM

Of the persons interviewed more than half of them were involved with the original purchase of the GIS used in their workplace. They had an opportunity to investigate various systems. Then, they had some time to learn about the system chosen for their workplace and use it nearly daily or weekly. Nearly 75% of all systems were purchased within the last three years. The majority of systems are multi-users systems and the amount of money invested was between \$ 50,000 and \$ 100,000. The majority of the systems were vector based, but most users indicated the need to integrate raster information. Many complained that this was not possible because of lack of equipment or technical know-how. When asked whether the GIS is regularly upgraded, nearly half of the respondents complained that this was not the case because of lack of the funding.

The assumption can be made that the current recession in Massachusetts has a major impact on the new technology. Systems are not upgraded on a regular bases. This may influence not only the current work environment but also the attitude of users who are becoming more proficient in GIS applications as well as the occasional user who would use the system for a specific project. Without time and effort being given to upgrading, the opportunities for development of new and totally unexpected applications are reduced.

Satisfaction With The System

The majority of users (83%) are satisfied with their systems overall, but many complained that the systems were not user-friendly. When persons are asked to rate the ease of using their system the majority of users (82%) felt the systems, are not easy to use. They often had to relearn a specific application after some time had lapsed. They also indicated that the systems are not compatible with other software and that often problems arise when data are integrated. Many cited that the system needed to be expanded because of lack of memory especially when digital data sources are

integrated. Some complained that the system is not cost effective, and others do not like the final output.

The above indicates the growing complaints people have with computer systems in general, and specifically with GIS. The systems are complex and do require a long period of time for users to become comfortably proficient with them.

Most users indicated that their place of work employs one person to run the GIS. In general this position is at the entry level. They can move up to the technician or middle management level. This is not surprising considering that nearly fifty percent of all GIS positions were filled within the last five years.

GIS APPLICATION

When users were asked for what kind of work they use the GIS, a wide variety of applications were mentioned. The following is not in any kind of order: Environmental Planning, Site Planning, Land Information, Transportation Planning, Management, Utility Planning, Data Analysis, Landuse Inventories, Groundwater Mapping, Pavement Management, Database Development, Acid Rain, Parcel Management, Real Estate Inventory, Epidemiology, Mental Illness, Facility Planning, Pollution Control, Marketing, Public Works, Data Standards and Accuracy, Population Planning, Research, Data Analysis.

The Massachusetts GIS users are involved in many different applications. When asked which function of the GIS was most useful to them they indicated that data analysis and data output were of great importance.

Importance of System Functions

Table 3

Data Input:.....	2%
Data Storage.....	2%
Data Manipulation/ Statistical Applications.....	11%
Data Analysis:.....	25%
Data Output - in Map Form:.....	25%
in other Form:.....	5%
Other: All the above.....	30%

Data Format

The data format used by participants was split almost evenly between digitizing from existing or gathered information and information received in digital form. With more data bases available the users probably will buy more data sets in the future.

Frequency of GIS Uses

It was revealed above that users complained that their systems were not user friendly and that they had difficulties remembering certain functions after they had not used them for a while. Thus, the frequency of use of a GIS is important.

How often the GIS was used by the respondents is summarized on Table 4.

Frequency of GIS Use

Table 4

Daily:.....	53.6%
Weekly:.....	35.2%
Monthly:.....	0.8%
For Specific Projects:..	10.4%

Users were nearly divided between daily use and less frequent use. Less frequent use is complicated if the system is not well documented.

CONCLUSIONS

This study has given a small glimpse at the GIS profession and the diversity of applications which users employ. While many users have technical training in computer science, there seems to be a need to integrate geographical knowledge and concepts with the new technology. This raises a question about the geographical approach and background of the GIS user. Wise development of GIS applications calls for basic involvement of planners and managers at the early stage in the conceptualization of a project. The diversity of users groups and support systems through electronic mail or the like can provide a major service to the profession.

References

- Chorley R., 1988. Some reflections on the handling of geographical information. *International Journal of Geographical Information Systems* 2(1):3-9.
- French, S.P. and Wiggins L.L., 1989. California planning agency experiences with automated mapping and geographic information systems. *Environment and Planning B* 17:441-450.
- Masser, I. 1988. The regional Research Laboratory initiative; a progress report. *International Journal of Geographical Information Systems* 2(1):11-22.
- Rhind D.W. and Mounsey, 1989. Research policy and review 29: the Chorley Committee and "Handling Geographic Information". *Environment and Planning A* 21:571-85.
- Troppen, Fred J., 1991. GIS Education in the Netherlands: A Bit of Everything and Everything about a Bit. *Cartographica*, 28 (3):1-9.