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## **Identifying Unethical Conduct in the Use of GIS**

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### **ABSTRACT**

It often has been argued that no technology is value-neutral. Therefore, one extension of the argument suggests that the power of geographic information system (GIS) technologies should be used for beneficial purposes. GIS should be used to enhance the quality of life, promote equity in access to knowledge for all members of society, reduce socio-economic gaps between members of the social system (or at least not widen them), and other "good purposes." The limitations of such reasoning and goals become readily evident when one attempts to apply such principles in everyday practice. Numerous gray areas exist in the use of GIS and determining what constitutes a beneficial versus a detrimental consequence is a value laden judgment. In many instances, "fair, just, and equitable" conduct and results are not obvious. They often depend on the perspectives of those affected by use of the information system.

This paper begins by distinguishing illegal conduct from unethical conduct. It then presents a method for gauging whether conduct in the use of GIS will be considered unethical by those affected by its use and to what extent.

### **INTRODUCTION**

Ethical conduct is often defined as that behavior desired by society that is above and beyond the minimum standards of behavior established by law. As such, this additional desired conduct is unenforceable in the courts. It is conduct to which we wish everyone would aspire for our mutual benefit. However, it is also conduct that for one reason or another we cannot mandate or do not wish to mandate through legislative enactments. For instance, a general policy exists in the law that legislation should not be enacted that is very difficult or highly impractical to enforce. A law requiring each of us "to be nice" would invite flaunting of the legal system as a whole and therefore such laws are avoided in order to preserve the sanctity of the system. Similarly, legislation "dare not get too far away from popular attitudes, habits, and ideals in the various situations that keep coming up in everyday life" (Mermin 1978, p.13). To do so would only invite the breach of such laws. Therefore, much conduct that might be deemed unfair or unjust by a large majority of society is not banned by law. Banning such conduct would either adversely impact the operation of our legal system as a whole or would impinge too much on other valued freedoms.

The large rounded rectangle in Figure 1 is intended to represent all societal conduct. Note in the

figure that the largest body of societal conduct is legal conduct with no public judgment as to whether the conduct is ethical or not. A certain segment of possible conduct has been carved out by our laws as being illegal, represented by the circle. Persons acting illegally are, of course, subject to sanctions imposed by our judicial system.

We also may classify a subset of societal conduct as being either ethical or unethical, represented by the small rectangles to the left and right of line AB respectively in Figure 1. As illustrated, most ethical conduct is also legal. However, certain conduct considered ethical by an individual may abridge our societal laws. For instance, an individual might break the law to prevent a far greater societal law from being broken (e.g., breaking the speed limit to prevent a murder). Euthanasia is another example of illegal conduct that may fall in this category.

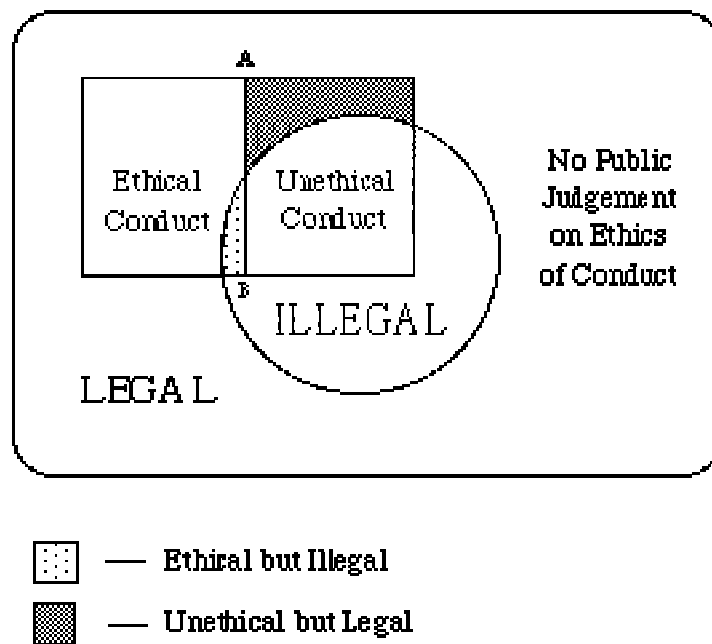


Figure 1. Societal Conduct

Much unethical conduct is also illegal. However, a significant body of conduct exists that is unethical yet legal. Such conduct is represented by the darker hatched area of Figure 1. This paper is most concerned with identifying this specific body of conduct.

Though somewhat nebulous itself, the line between legal and illegal conduct (the circle) is a much easier line to define than the line between ethical and unethical conduct (line AB). In determining whether an anticipated act is legal or not, we may resort to written statutory and case law. In determining whether an anticipated act will be considered ethical by our peers and society, we have only general principles to draw upon.

## PROFESSIONAL CODES OF CONDUCT

In determining whether an action will be considered unethical, unfair or unjust by a group in society or by society as a whole, we normally try to anticipate whether a consensus or large

majority opinion of the group would hold the action to be unethical. Because it is seldom practical to take opinion polls before taking most actions, business associations and professional societies often develop codes of conduct to act as general guidelines of conduct for their members.

The GIS community is so new that codes of conduct have not yet been developed or offered expressly for its practitioners. However, codes of conduct have been developed for many closely related groups. For instance, codes of conduct that may be relevant for the GIS community to consider include those prepared by the Association of Computing Machinery (ACM), the Data Processing Management Association (DPMA), the Institute for Certification of Computer Professionals (ICCP), and those organizations that regularly sponsor conferences on GIS issues. Also germane are the more generalized tenets of practice relative to technology and moral responsibility contained in such documents as the Mount Carmel Declaration (Kranzberg 1980, p. 227).

Usually codes of conduct prepared by professional or business organizations are intended as goals to aspire to. The principles outlined are not meant to be strictly enforceable. Typically, only the most blatant violations of codes of conduct (that is, those that are also illegal) might result in some sort of sanctioning by the group, such as suspension of membership or expulsion from the group.

Statutes and administrative regulations, however, carry the force of law. Therefore, codes of conduct adopted by state licensing boards would be enforceable at law except for the fact that the conduct described in them is often intentionally couched in such general terms that the provisions are impossible to enforce in practice. Thus, even under licensing regulation scenarios, the intent of codes of conduct typically is not to define legal versus illegal conduct but to provide goals to which members of the profession should aspire in their conduct. Such codes are placed in writing with the full realization that most professionals will not be able to rigorously or always adhere to the goals and that the provisions will not be strictly enforceable.

If not generally enforceable, of what benefit are professional codes of conduct? In short, they let individuals in the discipline know what is expected of them by the rest of the profession and by the public. Codes of conduct put us on notice. Although we are unlikely to incur formal sanctioning if we blatantly step over the bounds of ethical conduct, loss of respect with the rest of the discipline is likely to result in informal sanctioning. Loss of economic and personal well being through imposition of a "bad reputation" by the rest of the community may be no less severe than if imposed by formal sanctions.

One of the problems with professional and business society codes of ethics is that they are most often developed by consulting the opinions of members of the group or discipline without also consulting opinions of the consuming public or the public at large. As a result, there is typically present in such codes an emphasis on fair dealings among members of the group and a bias towards members of the discipline over members of the public. For instance, conduct in dealing with clients that many members of a professional group consider to be "smart business practices" may be considered by the consuming public to be substantially lacking in treating them fairly or in protecting their interests. Therefore, codes of ethical conduct should be prepared by gauging opinions of both the discipline and at least that sector of the public likely to be dealing with the products and services provided by the discipline.

## ETHICS IN THE DEVELOPMENT AND USE OF GIS

Assuming that one wants to develop a code of ethical conduct for those involved in the development and use of GIS, one obvious place to start is to consult ethical conduct guidelines created previously by closely affiliated disciplines. For instance, the codes of the organizations mentioned previously might offer good models for a GIS membership organization to use in initiating its own code of conduct. However, codes of conduct are likely to have very little impact if they are mere paper exercises. In addition, it is not so much that a code of conduct is needed but that simple information is needed on what the community believes is ethical or unethical conduct relative to the use of GIS.

To gather community beliefs, the following three steps are recommended:

1. Describe conduct situations currently occurring or likely to occur in GIS practice that may give rise to ethical decision-making.
2. Obtain opinions from members of the discipline on the appropriateness of the conduct described.
3. Obtain opinions from members of the public on the appropriateness of the conduct described.

Knowing what the community believes in regard to specific scenarios and actions is valuable in itself. In addition, generalizable rules of ethical conduct that might be derived from such fact scenarios, if well drafted, should have greater relevance and constancy over time than rules constructed from mere armchair reflection.

In attempting to draft codes of ethical conduct, it is well to keep in mind that opinions will change over time. Majority and consensus opinions of groups change as technology, politics, and other social forces alter the collective beliefs of individuals and change methods of business practice. Thus, collective public and professional opinions relative to the appropriateness of specific conduct in specific situations will often change over time. However, opinions regarding general principles of ethical behavior are likely to change at a much slower rate.

In an attempt to determine whether certain conduct currently occurring within the GIS community generally is considered by others to involve ethical decision making, several hypothetical fact situations have been developed and are attached to this article. The form of the questionnaire and the scenario statements are modeled after forms and scenarios presented in *Ethical Conflicts in Information and Computer Science, Technology, and Business* (Parker, Swope, and Baker 1993). The resulting questionnaire is intended to be used with focus groups of discipline experts and with focus groups of members of the public who might be involved in consuming GIS products or services. The questionnaire is merely illustrative at this point and numerous other hypothetical scenarios should be added prior to its actual use with focus groups. Any principles derived through the focus group process should then be tested on a much wider audience.

Developing ethical guidelines for the GIS community is very problematic due to the amorphous nature and newness of the community. Development should be cautious. The approach proposed is similar to that recently used to update the ACM's Code of Ethics and Professional Conduct (Anderson, et. al. 1992, Anderson, et. al. 1993). Any consideration of a code of ethics for GIS

developers and practitioners must begin with similar expansive data gathering and analysis.

## PHILOSOPHICAL PERSPECTIVES

The ethicist and moralist probably would argue that ethical decisions and general ethical codes of conduct should not be developed through the taking of opinion polls. Rather, gathering data on the moral consensus of a matter is a step along the way in arriving at a solution. It is ethical theory and moral insights that should be primarily depended on in arriving at solutions. I agree with this perspective to the extent that once a code has been initiated through observation and analysis of current practice contexts and moral conditions, code and practice should be evaluated and honed by continuously reassessing their conformance with theory.

To explore this concept further we need to define several terms in the manner in which philosophers would define them. Ethics has been defined by philosophers as "the science of conduct." Ethics may be construed as a science in the sense that its study involves rational inquiry and the overall goal is attainment of truth. Ethics also focuses on the study of *conduct* as opposed to *behavior*. Behavior refers to activities in which people engage whereas conduct is a subset of behavior "... in which persons make voluntary choices between alternative courses of action because they have decided that they ought to choose one of the alternatives rather than the other" (Johnson 1984, p. 2). In general, social scientists study behavior because they are interested in how people act whereas ethicists study conduct because they are interested in how people *ought* to act.

For clarity, philosophers generally use the term *ethics* when referring to theory and use the term *morals* when referring to behavior in practice. In common language (e.g. "professional ethics") and as used previously in this article, the term ethics is often substituted for the term morals. However, the use of the distinction by philosophers allows them to provide another definition of ethics: the theoretical examination of morals.

The scholarly study of ethics has two primary traditions. The first, called deontological (concerning duty), is concerned with the rightness and wrongness of actions. Many ethicists have sought a single rule that would determine the rightness of actions and therefore would serve as a guide for our future actions. Unfortunately, the rules derived over time by the great philosophers have been numerous. Other ethicists have sought to answer the question of what makes an action right. Theories derived to answer the question generally fall within three classes: utilitarian theories, goodness of motive theories, and morally appropriate theories (Johnson 1984, p. 8). The second tradition in the systematic study of ethics, termed teleological (concerning ends), is concerned with the results of actions and their goodness or badness. Again, the suggested answers to the highest "goods" to be sought in life have fallen far short of being generalizable across a broad range of social circumstances. Regardless, the theories derived through the primary lines of ethical study also have many areas of agreement and have value in assessing behavior in the GIS community. Such concepts as autonomy of the person, beneficence and nonmaleficence, rights of individuals, and some aspects of paternalism appear to have relevance across many of the theories of the ethicists (Applebaum and Lawton 1990, pp. 31-48). Thus, this article suggests that once we know more about the current moral condition of GIS use, any derived code of conduct should be critiqued from a range of theoretical ethical perspectives. Rules derived from experience obtain their final validity and meaning from theory.

The social critiques of GIS applications that we have seen to date in the literature have been primarily by moralists as opposed to ethicists. The moral reformer is dedicated to a cause and takes strong actions in furtherance of that cause. Stances taken to oppose the use of GIS and related technologies in war (Smith 1992), to encourage the continued publication of topographical maps on the grounds that they offer a more democratic and humanistic form of geographical knowledge than offered by GIS (Harley 1990), and to oppose the use of certain cartographic techniques to "lie with maps" (Monmonier 1991) are all moral stances. We are likely to see future moralists advocating use of GIS for a stronger defense, for increased access by people to marketplace goods and services, for protecting the environment, and perhaps for advocating more obscure causes such as protecting the interests of adult Caucasian males. Many of the moral causes, of course, may conflict with each other. The ethicist questions the underlying principles and theories upon which the moralist stands. Such questions may dampen furtherance of a moral cause but they also help us evaluate which moral causes have merit and may be worthy of our support.

In developing rules of conduct for the GIS community, one problem in beginning with ethical theory and then moving to a GIS practice context is that of the disparity among the theories and derived principles of the respected ethicists. It is difficult to know with which aspects of which theories to begin. Instead, this article suggests that we should begin by attempting to better understand whether and to what extent moral consensus exists among those surveyed relative to the range of conduct that is currently being practiced in the GIS community. Perhaps this approach is most in line with the ethical theory of cultural relativism as suggested by one of the reviewers. Regardless, if rational analysis by moralists and ethicists is to follow, further knowledge of the current moral precepts in practice must be attained. The challenge then becomes one of providing a rational basis for our shared convictions about the way we ought to act in the context of our own discipline and the discipline's relationships to the rest of society.

## **PURPOSE OF OPINION GATHERING**

It is my belief that a significant number of GIS developers and practitioners have preconceived ethical notions of conduct that are strongly at odds with the ethical notions of the rest of the professional community and the general public. Whether this is true can only be evidenced through a data gathering and analysis process. The intent of collecting the opinions of others regarding past or future GIS practice decisions is not primarily to make judgments concerning the ethical or moral worthiness of any line of action. Rather, the primary intent of the exercise is to make practitioners aware of the potential ramifications of their proposed actions.

If it is known that a proposed action may be considered unethical or marginally ethical by a significant number of people, this allows the GIS practitioner to better weigh the potential drawbacks of the action against the potential benefits. If put on notice that ethics is an issue, the rational GIS practitioner is likely to consider the likelihood of sanctions being imposed by peer groups, customers, and licensing boards. The extent of losses to the GIS practitioner and to the practitioner's organization resulting from the potential economic and business sanctions, whether formal or informal, will be considered. If put on notice, the rational practitioner is also more likely to consider the effect of the proposed action on the public's perception of the GIS community as a whole.

In addition, a practitioner may choose for various reasons to take an action that he or she knows

is likely to be considered unethical by some of the practitioner's clients or peer group. By considering the possible ramifications of the action in advance and in detail, the practitioner will be better prepared to deal with them. By communicating the reasons for an action to those who are most likely to criticize the action and by describing steps taken to accommodate ethical concerns, the practitioner may be able to significantly lessen the adverse impacts of the action when actually taken.

## **CONCLUSION**

This paper calls for the observation of ethics in action. It calls for opinion gathering on the range of questionable conduct that is currently occurring in the development and use of GIS. It subscribes to the notion that whether conduct is "ethical, reasonable, and just" can best be articulated initially through consultation with those most closely involved and affected by the conduct being evaluated. At present, we do not know the opinions of these people. We should. Results should be tested against ethical theory prior to any attempt at developing a professional code of conduct for the discipline.

## **ACKNOWLEDGMENTS**

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## **APPENDIX**

The three examples in the questionnaire that follows are merely illustrative of the types of ethical conflict scenarios that might be constructed and used with focus groups. Other suggested scenarios might cover such issues as providing insufficient data quality in the GIS database for unforeseen uses and therefore causing unreliable decision making, causing unintentional harm to others such as degradation in the quality of life or safety of others through the use of GIS, selling the same GIS product to a second client without acknowledgment, protecting "sweat of the brow" when a GIS database is not protected by copyright, allowing deception in the use of GIS for analysis where the means are suspect but a socially desirable result occurs, and causing intentional harm to others through the use of GIS. Scenarios addressing much broader social issues might also be constructed; such as use of GIS as a tool in support of war or as a tool in support of electronic democracy

### **Questionnaire**

**Instructions:** Please read each of the following scenarios concerning the use of geographic information systems. After each scenario, use your personal opinions to answer the questions.

#### **Scenario 1: Professional Responsibility / Liability**

A civil engineering firm has been hired to carry out a site feasibility assessment and environmental analysis of a large land parcel. Developers would like to place a shopping center on the site. Under the state's professional licensing laws, civil engineers are held to a higher level of care than ordinary citizens or business people.

In initiating the site assessment, the engineering firm acquired extensive amounts of digital data on soil types, utility locations, ownership boundaries, ground elevations, zoning boundaries, subsurface waste locations, and similar data from a commercial geographic database that has been developed and maintained for the city's geographic area. The engineering firm pays a monthly fee for direct on-line access to the geographic information system (GIS). The



public/private corporation that developed and maintains the database generates large amounts of income through its GIS user fees.

In their site feasibility study and subsequent design work, the civil engineering firm has relied heavily on the GIS data supplied by the public/private corporation. However, individual civil engineers have complained to their company management that adequate indicators of reliability for much of the data in the GIS are lacking and therefore they are unable to determine the correctness and completeness of much of the data in the GIS.

Because their feasibility study and design work relies heavily on the correctness of the data, errors, blunders, or emissions in the data could cause economic losses or cause harm to people. The engineers want the data supplier to share the responsibility for any potential future losses.

The data supplier states that it is merely supplying data in a convenient digital form and has no involvement in its use. The engineering firm has the option of verifying through on-site measurements, observations, and tests that the data is correct and complete. Therefore, the data supplier should not be held responsible for any losses that might occur from imprecision, blunders, or lack of completeness in the data.

**Please provide your opinions or reasoning in the following spaces:**

**Party:** Engineers

**Conduct:** Seeking shared responsibility with the data suppliers for future losses.

conduct is conduct is conduct is other than  
unethical \_\_\_\_ illegal \_\_\_\_ unethical or illegal \_\_\_\_

Factors or reasoning relevant to your opinion:

**Party:** Data Supplier

**Conduct:** Resisting acceptance of responsibility for future losses.

conduct is conduct is conduct is other than  
unethical \_\_\_\_ illegal \_\_\_\_ unethical or illegal \_\_\_\_

Factors or reasoning relevant to your opinion:

Statements, General Guidelines, or Principles you can suggest that might be useful in dealing with this or similar conflicts in the future:

## Scenario 2: Data Sales by Government/Ownership of Intellectual Property

A few years ago a local community developed a town-wide land information system financed by taxpayers. Town administrators have been using the system for street and utility maintenance, zoning and building code enforcement, tax assessment, planning, routing of town services, inventorying of city buildings and real estate, and using it for various land use analysis purposes. The town soon discovered that the database was useful for a wide variety of private uses as well as public. Although the system was originally justified on cost savings to the town through increased efficiencies in agency operations, the town is now charging user fees for on-line access to the GIS and is selling products produced from the database to recover the costs of systems acquisition, maintenance, upgrades, and expansion. In fact, the fees are generating a substantial income that far exceeds the original costs and the continuing expenses.

Subdivision plats prepared by surveyors that were submitted over many years to the town for approval were incorporated into the database using a digitizing process. Although the town has transcribed the lot line dimensions from the original plats correctly, items such as the dates of field surveys, map legends, plat notes detailing limitations on the use of the survey work, and notes stating the standards that the survey work was intended to meet have not been incorporated in the land information system database.

In the vast majority of cases, surveyors are the copyright holders of the publicly filed plats and other maps that were used to develop the boundary and cadastral information now contained in the GIS. These surveyors argue that the maps and plats represent professional opinions of the surveyors (not just factual information) and that the municipality should have sought their permission prior to copying information from the maps and plats authored by them. The surveyors argue that their liability exposure to third party users is now likely to be greater as a result of the town's GIS development and they argue that they should be receiving a substantial percentage of all GIS fees being collected by the town.

The town feels that most of the information they copied into the GIS from the publicly filed survey plats was factual in nature and there was little unique authorship by the surveyors in the arrangement or selection of the information on the survey plats. They feel the general public should gain the full benefit of the fees they are collecting and the town refuses to pass any percentage of the fees to the concerned surveyors.

**Please provide your opinions or reasoning in the following spaces:**

**Party:** Town

**Conduct:** Charging user fees for on-line access to the GIS and selling products produced from the GIS database.

conduct is conduct is conduct is other than

unethical \_\_\_\_ illegal \_\_\_\_ unethical or illegal \_\_\_\_

Factors or reasoning relevant to your opinion:

**Party:** Town

**Conduct:** Refusal to recognize an intellectual property ownership right by surveyors in the documents that were copied to create the GIS database.

conduct is conduct is conduct is other than

unethical \_\_\_\_ illegal \_\_\_\_ unethical or illegal \_\_\_\_

Factors or reasoning relevant to your opinion:

**Party:** Surveyors

**Conduct:** Requesting compensation for copying of publicly filed survey plats and maps.

conduct is conduct is conduct is other than

unethical \_\_\_\_ illegal \_\_\_\_ unethical or illegal \_\_\_\_

Factors or reasoning relevant to your opinion:

Statements, General Guidelines, or Principles you can suggest that might be useful in dealing with this or similar conflicts in the future:

### **Scenario 3: Privacy**

In order to cash checks at large regional grocery store chains and discount store chains, customers must fill out an application that requests their name, address, phone number, and driver's license number. The application explicitly states that information about the applicant may be transferred to other parties if required by law or the management determines the transfer to be appropriate.

For the past year, all the major chain stores in a local region have been keeping track with their check-out scanners of the complete purchase histories of all of their customers who have purchased goods by check or credit card. In recent weeks, the businesses have come together to cross-match their files for their mutual benefit. In order to increase the value of the customer files for marketing purposes, the stores have already cross-matched each purchase history with the height and weight of each individual (acquired from their driver's license file), the scanned

photos of many of the customers (acquired from the photos required for membership in some of the discount store clubs), and the social security numbers of almost all the customers (readily obtainable from other commercial databases.)

A local engineering firm with considerable GIS expertise has been hired to cross-match these files with additional information accessible through government public records. The intent of the consortium is to sell access to the resultant files to other third parties who may have a business interest in them.

Specifically, the engineering firm has cross-matched the current customer profiles and addresses with taxing, assessment, and facilities records for each household, provided detailed cadastral information on the parcel (including the boundaries of each parcel and its current owner), and cross-matched the ZIP+4 designation for each household (along with the affiliated census data at the block level). In delivering its final datasets to the consortium of chain store businesses, the engineering firm strongly urged that information in the files that was tied or might be tied to specific individuals should be transferred to third parties only with the explicit consent of the individuals identified.

**Please provide your opinions or reasoning in the following spaces:**

**Party:** Chain Store Merchants

**Conduct:** Developing a database that allows merchants to construct detailed personal and household profiles for each customer.

conduct is conduct is conduct is other than

unethical \_\_\_\_ illegal \_\_\_\_ unethical or illegal \_\_\_\_

Factors or reasoning relevant to your opinion:

**Party:** Chain Store Merchants

**Conduct:** Selling detailed data on their customers to third parties.

conduct is conduct is conduct is other than

unethical \_\_\_\_ illegal \_\_\_\_ unethical or illegal \_\_\_\_

Factors or reasoning relevant to your opinion:

**Party:** Engineering Firm

**Conduct:** Cross-matching information from government files to allow more detailed profiling of individuals.

conduct is conduct is conduct is other than

unethical \_\_\_\_ illegal \_\_\_\_ unethical or illegal \_\_\_\_

Factors or reasoning relevant to your opinion:

Statements, General Guidelines, or Principles you can suggest that might be useful in dealing with this or similar conflicts in the future:

**Scenario 4. Copyright / Sweat of the Brow**

(scenario yet to be provided)

**Scenario 5. Selling Same GIS Product to Second Client without Acknowledgement (p. 92)**

(scenario yet to be provided)

**Scenario 6. Deception in the Use of GIS for Analysis (intentional use of inappropriate methods, means are suspect but not end result, i.e. socially desirable result occurs)**

(scenario yet to be provided)

**Scenario 7. Data Quality Insufficient for Unforeseen Uses (unreliable decisionmaking occurs)**

(scenario yet to be provided)

**Scenario 8. Unintentional Harm to Others through the Use of GIS (degradation of quality of life or safety of others)**

(scenario yet to be provided)

**Scenario 9. Intentional Harm to Others through the Use of GIS (i.e. evil outcomes)**

(scenario yet to be provided)

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## Background Information

Please answer the following questions about yourself.

1. Which of the following best describes your relation to the use or development of GIS?

direct user

indirect user

educator

consultant

GIS vendor

other: \_\_\_\_\_

2. Which of the following best describes the function of your employer or business?

government ( town/city,  county,  state,  federal,  other)

private sector business

education

other: \_\_\_\_\_

3. Which of the following best describes the primary activities you personally are involved with on a day to day basis.

administration/management

computer processing

planning

public works maintenance

engineering

property assessment

natural resource management

research

education

4. etc.