



Chapter 1

The Continuing Need for a Management Focus in GIS

It has been more than 10 years since the publication of the first edition of *Managing Geographic Information Systems*. This chapter briefly outlines the changes in geographic information systems (GIS) technology and in the field more generally and makes the case that there is a need for this extensively updated and enlarged second edition. After presenting our justification for this updated edition, we lay out the book, chapter by chapter.

As we complete this second edition of *Managing Geographic Information Systems*, the technology and its implementation have evolved and changed dramatically. The technology itself has become increasingly easier to use, with the expansion of graphic user interfaces that make it ever more accessible to nonexperts (so-called thin users). Accordingly, the implementation of GIS has grown by leaps and bounds in terms of both the number of users and the breadth of applications. This represents a dramatic expansion of the technology's market penetration in the decade or so that has passed since the publication of the first edition.

GIS and its cognate technologies—especially global positioning systems (GPS)—have become so commonplace that GIS has played a supporting role in a television series (*The District*), hand-held GPS devices are on sale at discount department stores and offered as an option on many automobiles, and a radio-frequency identification device (RFID) has been implanted in the arm of Mexico's attorney general as a demonstration

(www.msnbc.msn.com/id/5439055/). Dogs and other household pets are routinely fitted with a microchip that reveals the identify of beloved missing “Spike” or “Fluffy” and his or her owners, thus paving the way to a safe return home. (In spite of this technology, “Vivi,” the microchipped Westminster Kennel Club dog show participant has not been reconnected with her owners more than a year after the whippet escaped from her kennel at the airport.)

But wait, there’s more. Today consumers willingly provide an array of identifying information to retail establishments (both brick-and-mortar and online establishments) in exchange for special bargains, promotions, and other bonuses that are not available to anonymous shoppers. In return, the retailers that offer these bargains gain a great deal of information about each of their loyal customers along with the building blocks of a database that can help them guide their future business development activities. For the online consumer, the monitoring of their shopping habits usually generates a list of “suggestions” regarding future purchases based on past purchases, to which any regular customer of Amazon.com or Netflix will testify (coauthor Nancy Obermeyer included). And if that weren’t enough, closed-circuit TV records our activities whenever we are within camera shot—which is whenever we are in most brick-and-mortar establishments (both public and private) and in some jurisdictions when we are in any public space, including on the roads and streets.

Many of us are aware of the indelible tracks we leave in the wake of our purchases. What some people may not know is how readily visible many of our tracks are to people who do not know us personally. Many local governments, for example, make tax records available online, permitting anyone with an Internet connection to learn more about us than we know ourselves. Some of these online databases, for example, the City of Milwaukee’s, are available within the framework of an online, searchable GIS database. In another example, the tax records of property owners in Vigo County, Indiana, are available through an online search that provides names and addresses along with tax information (including whether or not the homeowner has paid his or her tax bill); this data set was finally attached to a base map in late 2006. In fact, the increased integration of GIS and its components with the Internet is another profound change for the technology, its users, and its managers.

These changes have had a profound impact on GIS and its management. Whereas the first edition of *Managing Geographic Information Systems* focused on efforts to bring the technology to organizations

that had not yet implemented them—at that time, this included most organizations—this second edition explores many issues that were barely on the radar screen back in the day.

Purpose and Objectives

The purpose of this chapter and the book as a whole is to introduce the challenges that organizations face in managing their use of what has become a mature technology, one that has a tremendous capacity to affect the activities and productivity of a public or private organization. This book is intended to provide a combined theoretical and practical foundation for the effective development and use of GIS within an organization.

GIS has become a common tool in organizations within both the public and the private sectors. Increasing capabilities, decreasing costs, and easier-to-use interfaces have all contributed to the diffusion of GIS. As Goodchild (2005: 4) points out, “We are moving rapidly from a *concert pianist* model of GIS as a tool confined to experts, to a *child of ten* model in which the power of GIS is available to all, the obvious concerns about powerful and complex technology in the hands of naive users notwithstanding.”

Managing GIS remains a two-pronged problem: mastery of the technology itself and understanding how to manage its effective use within an organization in the context of a specific institutional mission in service of a particular clientele. While there is far more literature available on GIS management today, this book aspires to address the primary issues associated with managing GIS technology and databases in an integrated and cohesive format, essentially providing “one-stop shopping” for its readers. This one-stop shopping, however, is designed to foster an increased interest in the individual chapter topics while providing bibliographic references that will lead the reader to more specific sources on topics of special interest.

The spread of GIS to a wider user base increases the importance of knowledge about managing this particular technology. Geography remains a key element of the technology, but meanwhile geographic knowledge remains less than ubiquitous. Moreover, the concerns raised by the use of the technology have expanded in both number and complexity. Today’s GIS manager must be alert to issues that were barely articulated a decade ago. The chapter topics are designed to address this need.

The Chapters

Those of you who are familiar with the first edition will recognize a few updated chapters from that version, but you will also notice major changes and additional materials. These changes include an expansion from 11 to 15 chapters. This obviously includes topics that barely registered in the GIS community a decade ago, but it also includes extensive coverage and updating of chapters that have remained from the first edition. We describe the content of all the chapters below.

Chapter 1. The Continuing Need for a Management Focus in GIS

This chapter sets the stage for the need for this second edition. In addition, we make the argument that the key to managing an efficient and effective GIS remains, at bottom, a human challenge born of the need to understand how and why people are affected by and in turn affect GIS dissemination and use. We briefly describe the changing scene within which GIS exists and within which managers must operate, and continue by introducing the rest of the chapters.

Chapter 2. Geographic Information Science: The Evolution of a Profession

What began in the 1960s as a useful technology for managing data with a geographic location has evolved to become something far greater. GIS has become a full-fledged profession. This chapter begins with a theoretical discussion of the characteristics of a profession and then describes how GIS (or geographic information science) has developed these characteristics and therefore qualifies as a profession. One of the key advantages of this evolution is that the field has become more well defined, with a better articulated body of knowledge and clearer norms and conventions of conduct. These are all discussed in Chapter 2.

Chapter 3. The Role of Geographic Information within an Organization's Information System

In order to best understand the implications and use of geographic information, it is necessary to place the GIS within the context of a larger, fully integrated information technology (IT) system that provides managers

with relevant information for performing their duties. The chief purpose behind an IT system is to aid managerial decision making by providing organizational members with comprehensive, comprehensible, and immediate information. This chapter elaborates the evolution of IT and then demonstrate how GIS fits into a comprehensive organization IT.

Chapter 4. Keeping the G in GIS: Why Geography Still Matters

This chapter is a holdover from the first edition, serving as a reminder of why geography still matters to GIS. GIS are a departure from the typical policy development tools because of their explicitly geographic component. One of the keys to unlocking the potential of GIS—and even more importantly, to avoid making serious mistakes—is a solid understanding of geography among GIS users. This chapter sheds light on geographic and cartographic principles that underlie GIS technology using examples from public policy analysis and cartography. The objective of this chapter is to raise the geographic consciousness of GIS users.

Chapter 5. GIS and the Strategic Planning Process

This chapter offers strategic decision makers and organization policy developers an understanding of how geographic information can be integrated into an organization's overall strategic planning process. We define the concept of strategic planning. We propose a general model of strategic planning that will serve as the basis for gaining a better understanding of all relevant elements in creating an organization's strategy. Finally, we analyze the role of GIS in developing comprehensive strategic plans and suggest that the type of information provided by a GIS makes it uniquely capable of enhancing the planning process for public and private organizations.

Chapter 6. Implementing a GIS: Theories and Practice

One of the key challenges in managing a GIS lies in gaining successful implementation of the technology in an organization. Although there are a number of impediments to its successful introduction, there are also several means by which an organization can better ensure its implementation. One critical factor in determining whether or not a GIS is likely to

be accepted and used is the existence of an identifiable champion within the organization. These project champions have a tremendous impact on acceptance and use of new technologies. This chapter highlights the roles that champions play, the ways in which champions can impact the GIS, and some means by which organizations can begin to identify and make use of champions as they seek to gain widespread support for and use of their GIS.

Chapter 7. Organizational Politics and GIS Implementation

“Politics” is a term that conjures up a variety of images, most of them unpleasant. However, both research and practice demonstrate that organizational politics is really another term of the use of informal means of power and influence to help implement GIS. This chapter reviews the evidence for the importance of political behavior in implementing information and GIS technologies; offers logical propositions as to why politics occurs; establishes the normative, or positive, perspective on the use of political behaviors; and presents the findings from two GIS implementation cases that demonstrate the critical role politics can play in either promoting or derailing GIS implementation efforts.

Chapter 8. Economic Justification for GIS Implementation

One of the routine tasks associated with implementing a GIS within an organization is developing a cost-benefit analysis in order to justify the costs of the technology. This chapter takes a step-by-step approach to describing how this is accomplished, covering the basics, including the time-value of money. While addressing issues associated with tangible costs and benefits, the chapter also addresses intangible costs and benefits.

Chapter 9. Sharing Geographic Information across Organizational Boundaries

An intriguing dynamic that is currently being observed is the use of data sharing across organizational borders. This so-called interorganizational data sharing occurs for a variety of reasons, some of them economic (no one organization can afford to be the sole collector and storehouse for geographic data) and some of them based on efficiency (the need to pool

resources among multiple organizations all needing the same data). This chapter takes an in-depth look at the data-sharing process, identifying the principal reasons (motivations) and means (mechanisms) by which organizations are willing to engage in sharing their geographic data with each other.

Chapter 10. Metadata for Geographic Information

Data are a crucial part of every GIS. This chapter focuses on the role of metadata in identifying appropriate data sets for use, as well as in sharing data with other organizations. The chapter goes into detail on the requirements for GIS metadata as developed by the GIS community with the framework of the Federal Geographic Data Center and encourages organizations to follow the recommendations to the best of their ability.

Chapter 11. Policy Conflicts and the Role of GIS: Public Participation GIS

In the first edition, we presented a hypothesis about the expanded use of GIS, suggesting that organizations would harness the technology to raise issues in the public arena. This chapter reasserts that original material in light of the development of what has come to be called “public participation GIS” (PPGIS), or sometimes “participatory GIS.” Specifically, PPGIS is an application of GIS usually among nongovernmental organizations (NGOs) that brings local knowledge to a debate regarding a policy decision that affects local people. This has been a key and growing area of GIS implementation.

Chapter 12. Ensuring the Qualifications of GIS Professionals

One of the concerns among organizations implementing GIS is staffing. As GIS has become more common, so has the need either to evaluate and hire individuals or to train existing staff to work with the GIS. Chapter 12 explores this issue through a discussion of the debate on certification of GIS professionals, an idea that has become a reality in recent years. In particular, the chapter discusses the specific standards, in terms of education, experience, and active engagement with the GIS community, that GIS practitioners should have in order to develop and maintain their

expertise in GIS. The chapter also discusses the growing importance of ethical behavior among GIS professionals.

Chapter 13. Legal Issues in GIS

The growth and diffusion of GIS technology has resulted in an expansion of the legal issues associated with it. When the first edition was published, discussion of legal issues was mostly found in disparate articles on the topic. Today the body of knowledge concerning legal issues in GIS has become more consolidated and cohesive. Because of this, and because of its growing importance to GIS managers, we include an extensive discussion of the most pressing legal issues in GIS in this revised edition.

Chapter 14. Ethics for the Professional GIS

This chapter discusses the rapidly evolving topic of ethics among GIS professionals. Early discussions of GIS ethics occurred in the beginning of the 1990s, but it has taken the development of certification of GIS professionals to bring this important matter from the talk forum to the action forum. Today, there is a GIS code of ethics and procedures to encourage GIS practitioners to abide by this code are nearing completion. This chapter discusses a topic that is of concern to everyone who uses a GIS.

Chapter 15. Envisioning a Future

The final chapter provides a brief summary of the key points of the book. More importantly, it suggests future directions in GIS that will influence the evolution of management issues, and discusses their implications.

Conclusions

The revised edition of *Managing Geographic Information Systems* represents our efforts to offer a challenge to the community of GIS practitioners as they manage their systems in an ever-changing environment. As the technology continues to proliferate and mutate, more and more individuals will find a need to understand not only how to run the software of their

GIS, but how to make best use of the technology within their specific organizational setting and in compliance with the best practice of the field.

We have done our best to be reasonably comprehensive in our coverage of topics, but because the field is shifting quickly, it is a moving target. For example, although we allude to the important role of the Internet in GIS, we do not include a chapter on this topic specifically at this time. Still, we hope you find value in our current effort, and we welcome your comments on our work.