# Contents

Acknowledgments xiii	
Introduction xv	
Chapter 1	GIS: The whole picture 1 Scope of GIS projects 3
	The who, what, when, where, why 4
	·
	Focus: Departmental versus enterprise GIS systems
Chapter 2	Overview of the method 7
	The nine-stage GIS planning methodology 7
	Focus: Let each step inform the next
Chapter 3	Consider the strategic purpose 11
Chapter 4	Build the foundation 15
	The planning proposal 16
	Assemble the teams 19
	The planning team
	The enterprise planning team
	The management committee
	The crucial role of GIS manager
	A note about the organizational structure

Focus: Plan ahead for the time commitment

Foreword

xi

#### **Chapter 5** Conduct a technology seminar 25

Seminar components and tips 26

Focus: Purpose of the technology seminar

Set the stage

Plan the program

Assess information needs

Rank the benefits

Go with the workflow

Focus: Modeling workflow processes

#### **Chapter 6** Describe the information products 37

Focus: IPDs: The building blocks of GIS planning

The individual components of an IPD 39

Title

Name of the department and person who needs it

Synopsis

Map output requirements

Focus: Three-dimensional representation

List output requirements

Document retrieval requirements

Schematic requirements

Display complexity

Steps required to make the product

Focus: Measuring display complexity

Focus: A rapid prototyping tool

Processing complexity

Frequency of use

Focus: Maximize efficiency

Logical linkages

Error tolerance

Wait and response tolerances

Current cost

Benefit analysis

Sign-offs

Case study: Tracking the IPD

Master input data list (MIDL) 67

Components of an MIDL

Assembling the MIDL

Focus: Using and creating a data cache

Focus: Data shoe box

Functions needed to input data 73

Case study: System functions needed to create the map

Setting priorities 74

The scoring method

The group-consensus method

Input data priorities

#### **Chapter 7** Consider the data design 75

Data characteristics 76

Scale

Resolution

Focus: Data accuracy

Map projection

Error tolerance

Case study: Determining the required positional accuracy

Data design capabilities 82

Survey capabilities

Topology

Temporal data

Cartography

Spatial analysis

Focus: Data structure for networks

Network analysis

Terrain modeling

Imagery

Mobile technology

Community GIS

Data logistics 90

Digital data sources

Focus: Finding data on the Web

Standards for technology and data

Data conversion and interoperability

### **Chapter 8** Choose a logical database model 97

The relational database model 98

Components of the relational model

The object-oriented database model 102

Components of the object-oriented database model

Class diagrams

The object-relational database model 106

Focus: Ontologies

The geodatabase

Advantages and disadvantages 108

## **Chapter 9** Determine system requirements 113

Scoping hardware requirements 114

Data handling load

Defining workstation requirements

Data hosting and user locations

Data storage and security

Preliminary software selection 117

Summarizing the function requirements

Classifying system functions

Interface and communication technologies 119

Choosing a system interface

Focus: Data capacity and data-transfer rates

Network communications

Client-server architectures

General issues of network performance

Determining system interface and communication requirements 126

Distributed GIS and Web services 127

Platform sizing and bandwidth requirements 127

User workflows

Workflow technology choices

Standard workflow baselines

Custom workflows

Case study: City of Rome system requirements

Other considerations 149

Organization policies and standards

Technology life cycles

The preliminary design document

# Chapter 10 Consider benefit-cost, migration, and risk analysis 153

Benefit-cost analysis and cost models 153

Focus: The cost model

Identify costs by year

Calculate benefits by year

Compare benefits and costs

Focus: The benefit approach

Calculate benefit-cost ratios

Migration strategy 159

Legacy systems and models

New considerations

Pilot projects

Risk analysis 161

Identify the risks

Discuss the risks in context

Describe ways to mitigate the risks

Assess and score each risk

Summarize the level of risk

# **Chapter 11** Plan the implementation 165

Anticipate the challenges of implementation 166

Staffing and training

Focus: Key issues to address in implementation planning

Focus: GIS leadership teams: Establishing responsibilities

GIS funding

Organizational issues 172

Institutional interaction requirements

System requirements and data

Legal review

Security issues

Existing computing environment

Risk analysis

Alternative implementation strategies

System procurement 177

Focus: Selection criteria

Activity planning 179

The final report 183

Report components

GIS management committee review and approval

Merging the GIS plan with the overall business plan

Implementation change 185

Technology change

Institutional change

Managing change 187

Start with an enterprise-wide plan

Add information products

Acquire technology

Inform management about change

Keep your plan current

Appendix A GIS staff, job descriptions, and training 191

**Appendix B** Benchmark testing 197

Appendix C Network design planning factors 203

**Appendix D** Request for proposal (RFP) outline 207

Appendix E The preliminary design document 209

**Appendix F** Custom workflows 213

Lexicon 221

Further reading 237

Index 239