

# **Modeling Cities and Regions as Complex Systems**

From Theory to Planning Applications

Roger White, Guy Engelen, and Inge Uljee

The MIT Press  
Cambridge, Massachusetts  
London, England

# Contents

Acknowledgments vii

1 Introduction 1

2 Theory and Consequences 13

3 Approaches to Modeling Cities and Regions 43

4 Urban Systems and Spatial Competition 65

5 The Fractal Forms of Urban Land Use Patterns 87

6 Urban and Regional Land Use Dynamics: Understanding the Process by Means of Cellular Automaton-Based Models 103

7 The Bigger Picture: Integrated Multiscale Models 141

8 The Cellular Automaton Eats the Regions: Unified Modeling of Activities and Land Use in a Variable Grid Cellular Automaton 175

9 Issues of Calibration, Validation, and Methodology 213

10 Emerging Theory 235

11 Modeling in Support of Spatial Planning and Policy Making: The Example of Flanders 251

12 Paths to the Future 295

References 305

Index 323