

# Contents

1	Preface.....	11
2	Basic approaches and principles of urban simulation modeling.....	13
2.1	Cellular automata based models.....	14
2.1.1	MOLAND .....	19
2.1.2	SLEUTH.....	27
2.1.3	Conclusion of cellular automata based models.....	29
2.2	Spatial interaction models .....	29
2.2.1	ITLUP .....	36
2.2.2	Conclusion of ITLUP .....	38
2.3	Random utility based discrete choice models .....	39
2.4	Spatial input-output models.....	45
2.4.1	MEPLAN.....	46
2.4.2	PECAS .....	49
2.4.3	TRANUS .....	55
2.4.4	Conclusion of spatial input-output models .....	58
2.5	Dynamic models.....	61
2.5.1	IRPUD .....	61
2.5.2	DELTA .....	71
2.5.3	Conclusion of dynamic models .....	79
2.6	Micro-simulation models.....	81
2.6.1	UrbanSim .....	88
2.6.2	ILUMASS .....	97
2.6.3	ILUTE .....	101
2.6.4	Conclusion of the micro-simulation models.....	110
3	Comparison of urban simulation models.....	113
3.1	Theoretical foundations.....	113
3.2	Comprehensiveness.....	116
3.3	Structure.....	117
3.4	Spatial and temporal dimensions of processes .....	122
3.5	Behavioral aggregation.....	125

<b>4</b>	<b>Urban simulation models from the behavioral perspective .....</b>	126
4.1	Actors.....	127
4.2	Decision making of actors.....	129
4.2.1	Decision making of households .....	130
4.2.2	Decision making of economic actors .....	135
4.2.3	Decision making of developers .....	137
4.2.4	Decision making of public authorities.....	138
4.3	Activities of actors .....	139
4.4	Markets as motivational frameworks.....	139
4.4.1	Housing market.....	141
4.4.2	Commercial floorspace market.....	143
4.4.3	Job market.....	143
4.4.4	Goods and services market .....	144
4.4.5	Transportation market .....	144
4.4.6	Approaches to the modeling of market interactions.....	147
4.5	Interaction of actors with the physical environment .....	149
4.6	Interaction of actors with the institutional environment.....	150
4.7	Conclusion .....	151
<b>5</b>	<b>Operational issues of urban simulation modeling.....</b>	153
5.1	Calibration and validation of models.....	153
5.2	Use of models for policy impact assessment.....	157
<b>6</b>	<b>The key challenges for urban simulation modeling.....</b>	162
<b>7</b>	<b>Experimental applications of urban simulation models in the Czech Republic .....</b>	167
7.1	Modeling demographic changes and residential mobility.....	173
7.1.1	Demographic Model.....	173
7.1.2	Residential Location Choice Models .....	177
7.1.3	Conclusion of modeling demographic changes and residential mobility.....	200
7.2	Modeling mobility of economic actors.....	204
7.2.1	Business Relocation Choice Model.....	208
7.2.2	Business Location Choice Model .....	211
7.2.3	Conclusion of modeling mobility of economic actors.....	214
7.3	Modeling the monetary valuation of residential characteristics.....	216
7.3.1	Housing Price Model.....	217
7.3.2	Conclusion of housing price modeling.....	222

7.4	Land-use change modeling.....	224
7.4.1	Land-Use Change Model.....	226
7.4.2	Conclusion of land-use change modeling.....	233
<b>8</b>	<b>Potentials, challenges and suggestions for urban simulation modeling in the Czech Republic .....</b>	<b>235</b>
8.1	Core set of micro-data .....	235
8.2	Potential application in policy analysis.....	236
8.3	Methodological and ethical challenges .....	238
8.4	Deficiencies in the data.....	239
8.5	Suggestions for future research and development .....	240
	<b>References .....</b>	<b>243</b>
	<b>Index .....</b>	<b>255</b>
	<b>Tables .....</b>	<b>259</b>
	<b>Figures .....</b>	<b>261</b>
	<b>Appendix A .....</b>	<b>265</b>
	<b>Appendix B .....</b>	<b>280</b>