

Introduction

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This collection results from work in the research field “Methodologies in Metropolitan Research” within the Competence Field Metropolitan Research (KoMet; see <https://metropolenforschung.uaruhr.de>). KoMet was established as a joint competence field by the three universities in the University Alliance Ruhr (University of Duisburg-Essen, Ruhr University Bochum and TU Dortmund University) in 2017. It brings together over 120 researchers from a broad range of disciplines engaging with central aspects of metropolitan research. While the Ruhr region with its over 5 million inhabitants and its history of post-industrial transformation is an obvious focus of research, comparative perspectives and research on other metropolitan regions especially in Europe, East Asia and North America are also central to research in KoMet.

In 2018, a broadly cross-disciplinary group of researchers particularly interested in methodological questions in metropolitan research established a sub-research field of its own and launched a series of workshops, in which central methods and approaches from a range of disciplines were presented and points of intersection and processes of transfer were discussed. Here, central questions have been:

- How can quantitative and qualitative research approaches be reasonably combined?
- What are the possibilities and limits of different approaches to modelling complex urban and metropolitan systems, e.g., agent-based modelling, genetic algorithms, stochastic optimization, cartographic visualization, verbal models, everyday models and mental maps – and to what degree are these models complementary?
- Which methods can be used to model and to seek to manage such complex systems – and at what cost?
- How do differing approaches – both theoretical and practical – measure up and where are the boundaries?
- How can inter- and transdisciplinary metropolitan research be organized around paradigmatic concepts such as ‘complexity’, ‘transformation’, ‘polycentricity’, ‘narratives’?

In the winter term of 2020/21, members of the research field also convened and contributed to the long-established “Ruhr Lecture: Key Issues in Metropolitan Research”, an

interdisciplinary lecture series which, in each winter term, features one of the research fields in KoMet. In the course of this semester, the idea for the present collection of essays emerged.

The volume is conceived as complementary to a range of encyclopedias, handbooks, companions and readers in the fields of urban and metropolitan research: It neither seeks to replace (1) *the voluminous (and costly) encyclopedias and handbooks on the city or on urban research*, such as Anthony M. Orum's 4000-page *Encyclopedia of Urban and Regional Studies* (2019) or Hutchison's two-volume *Encyclopedia of Urban Studies* (2009) with their entries on scholars, individual cities, thematic issues, key concepts or historical development, nor (2) *the established or the recent readers and companions in the field of urban studies and city research* such as Bridge and Watson's *New Blackwell Companion to the City* (2013), LeGates and Stout's *City Reader* (7 2020) or Orum, Ruiz-Tagle and Vicari Haddock's *Companion to Urban and Regional Studies* (2021). Nor does it compete with (3) *the classic one-volume reference works* such as Caves's *Encyclopedia of the City* (2005/2013) or Gottdiener and Budd's *Key Concepts in Urban Studies* (2005) or with (4) *the enormous range of both introductions to and in-depth discussions of methods in urban analysis for virtually any discipline or circumscribed group of disciplines engaging in urban research* – and, as Frank Eckardt (2009) has argued, in an urbanized world, there is hardly a discipline that does not. Nor, finally, does it form part of the (5) *numerous studies engaging more specifically with urban complexity, urban systems analysis and urban modelling as a multi-, inter-, and transdisciplinary endeavour* (Albeverio 2009; Portugali et al. 2012; Batty 2013; Walloth/Gurr/Schmidt 2014; Liu 2020). What is largely missing in this wealth of publications, we find, is a survey of methods and approaches in metropolitan research across a range of disciplines (one of the few publications addressing this need is Verloof and Bertolini's 2020 collection *Seeing the City: Interdisciplinary Perspectives on the Study of the Urban*).

Thus, without any claim to being exhaustive, what this collection therefore seeks to provide is an overview of key methods and approaches to metropolitan research that is both scholarly *and* accessible to a wider audience. The disciplines represented in this collection include architectural history, art history and the study of the built environment, geoinformatics and spatial analysis, cultural heritage preservation and cultural memory studies, literary and cultural studies, spatial planning and planning theory, urban sociology, economic geography, technology studies, transport planning, urban economics and operations research, aquatic ecosystem research, as well as urban epidemiology. This scope, as far as we can see, is unique in one-volume works, and so is the focus on methods and approaches. Moreover, while, admittedly, most contributions themselves are still largely disciplinary, and the volume as a whole is thus more multi- rather than fully interdisciplinary,¹ both the individual articles as well as the collection in its entirety seek to contribute to and to further interdisciplinary urban research in that they are written so as to be accessible to metropolitan researchers from other fields and that they formulate interfaces, points of contact and overlaps with other disciplines. Moreover, the volume is organized not primarily by disciplines but thematically, so as

1 For detailed discussions of the rewards, challenges and pitfalls of interdisciplinary collaboration, see the collections by Frickel/Albert/Prainsack 2017; Frodeman 2017; Menken/Keestra 2016; for a brief discussion of conceptual as well as practical challenges, cf. Gurr/Kluwick 2021.

to highlight the way in which metropolitan research lends itself to and frequently even requires interdisciplinary collaboration in order fully to do justice to the complexities of metropolitan regions.

Section I, *Metropolitan Space and the Built Environment*, assembles essays on different approaches to urban form, ranging from architectural history and the study of urban typology, morphology and iconography via geoinformatics and the statistical analysis of spatial structures to questions of urban art history, architectural history and historic preservation. With a sequence of essays on different approaches to the quantitative and qualitative analysis of metropolitan space, this section thus also initiates the conversation on convergences, divergences and complementarities between quantitative and qualitative approaches.

Section II includes articles presenting central methods in the analysis of *Metropolitan Functions and Infrastructures*, surveying research on central places, on the analysis of economic clusters, on the modelling of infrastructure systems and on methods in urban transportation research. Though primarily quantitative in orientation, the essays in this section nonetheless continue the conversation on the intersections between quantitative and qualitative metropolitan research.

With articles on disaster risk and climate impact research from a spatial planning perspective, on the use of social media data for sustainability research, on biodiversity research in urban water bodies by means of DNA analysis in water samples all the way to key concepts and methods in urban public health research, section III on *Metropolitan Resilience, Sustainability, and Health* includes a similarly broad range of disciplines and methods. Here, too, rather than following a *disciplinary* logic, the essays *thematically* focus on key urban challenges.

Section IV, *Metropolitan Culture(s)*, is predominantly qualitative and brings together analyses of the forms and functions of storytelling, on the analysis of narratives and on the theory and analysis of collective symbols. The essays centrally engage with the 'story turn in planning' and the strong interest in questions of metropolitan (self-)representations and thus contribute to the flourishing field of literary and cultural urban studies. Given the underlying question about the potential role of the humanities in interdisciplinary urban research, this section, too, engages with some of the central challenges of interdisciplinary urban and metropolitan studies.

Key questions and issues of inter- and transdisciplinary metropolitan research, for instance concerning the role of comparative analyses or the convergences and complementarities of quantitative and qualitative approaches, are then explicitly addressed in the final section on *Interdisciplinary and Mixed-Methods Approaches to Urban Complexity*. This includes contributions on comparative approaches, on quantitative and qualitative approaches to urban modelling, on the typification of urban neighbourhoods, and on the long-term mixed-methods monitoring of large-scale urban development projects.

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