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Introduction to the Handbook of Research Methods and Applications for Mobilities

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Published in:

Handbook of research methods and applications for mobilities

Publication date:
2020

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Büscher, M., Freudendal-Pedersen, M., Kesselring, S., & Kristensen, N. G. (2020). Introduction to the Handbook of Research Methods and Applications for Mobilities. In M. Buscher, M. Freudendal-Pedersen, S. Kesselring, & N. G. Kristensen (Eds.), *Handbook of research methods and applications for mobilities* (pp. 1-10). Edward Elgar Publishing.

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Introduction to the *Handbook of Research Methods and Applications for Mobilities*

Monika Büscher, Malene Freudendal-Pedersen, Sven Kesselring and Nikolaj Grauslund Kristensen

The growing field of mobilities research focuses on the flows and movements of people, artefacts, capital, information and signs on different social and geographical scales. Scholars in mobilities research are working on the physical movement of people and goods, digitalised (social) relations and communication between individuals, groups, organisations and institutions, the experience and embodiment of space in motion and dwelling, and many other subjects. Mobilities research examines the systems and practices of mobilities from different theoretical, epistemological and methodological perspectives, but with a common ontology of mobilities as the constitutive element of societies, politics and economies (Urry 2000; Sheller and Urry 2016; Sheller 2017; Jensen et al. 2019).

This *Handbook* reflects the variety and diversity of the field in respect of research methods and applications for mobilities research, while also illuminating the multiple dimensions of mobilities, from transport to tourism, cargo to information as well as physical, virtual and imaginative mobilities. In these contexts, the motivation to make methods mobile springs from a deep appreciation of how ‘the reality is movement’ (Bergson 1911, p. 302). The new mobility paradigm (Sheller and Urry 2006) not only broadened the perspective by including social and cultural practices in the study of mobilities, but also added a new epistemological, creative, normative, public dimension to doing research. Mobile methods provide new insights by mobilising an analytical approach to the constitutive role of (im)mobilities (Büscher et al. 2010; Fincham et al. 2010). This may literally mobilise researchers in ethnographic go-alongs, as many of the authors in this *Handbook* describe (for example, Wilson, Chapter 12 in this volume), or metaphorically mobilise research by self-tracking (Duarte, Chapter 6 in this volume), following the mobile positioning of mobile phones (Silm et al., Chapter 17 in this volume) or through cultural analysis (Perkins, Chapter 15 in this volume), and it may mobilise research subjects in planning (Bennetsen and Hartmann-Petersen, Chapter 22 in this volume) or through phronesis (Tyfield, Chapter 33 in this volume). Mobilising research means employing the understanding of how research objects, subjects field sites and collaborators are mobile and in movement rather than geographically fixed or static. With the mobilities paradigm, interdisciplinary research and qualitative methods have come to the fore, compared with earlier traditions of mobility and transportation research (see, for example, Yago 1983; Vannini 2015). Researchers and research users engage with mobile methods, to investigate the emergent nature of reality and the way in which social and material phenomena are socially constructed and made durable in and through the intra-actions of many human and non-human agencies (Barad 2007).

Currently, not only the subject of investigations but also many research collectives are on the move, bringing mobile, inventive, live methods and methodologies into different contexts, from health care to aeromobilities, tourism to urban development, and many

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more. This occurs by creatively engaging with the dynamics of complex systems, processes of becoming and emergence, and multi-scalar interconnections between microbial, human, animal, technological and planetary agencies. The field of mobilities research is broad in its interest, tracing social mobility, political movement, and transformations of time and space, opening up new avenues for transdisciplinary research co-creation. It is often about defining new ways of creating the infrastructure for more richly informed applications of research and collaborations, and ways of staying with the troubles of contemporary challenges (Le Dantec and DiSalvo 2013; Haraway 2016). All this builds the background for the interdisciplinary content of the *Handbook*. The perspective applied here is broad and deep, and the contributions of this *Handbook* each focus on specific aspects of the field. In so doing, each chapter highlights how interconnected and spread out the mobilities turn in social science has become during the past 20 years.

The *Handbook* gathers and introduces a broad range of creative and explorative methods and methodologies in the field of mobilities research and its varied applications. The focus is on introducing different research approaches to broaden our understanding of global mobilities challenges in the contemporary (and future) world, ranging from low-carbon mobility system transitions, to the increase of digitalisation in questions of ethics, philosophy and (ontological) security and risk. The call for interdisciplinary research is widely significant for facing current and future mobilities challenges. The research gathered in this *Handbook* introduces the reader to ways of mobilising – conceptually, theoretically, conceptually and practically – both quantitative approaches (such as self-tracking and artificial intelligence, or AI) and qualitative methods (such as technography and participative observation). It will serve as a resource for researchers and research users in different disciplines and contexts, as it brings together key contributions on qualitative and quantitative research (and its multi-method combinations) and research on co-creation methods within the mobilities paradigm.

Through the *Handbook* the capacities of methods and applications for mobilities research will be presented and synergy will be developed from the methodological creativity and impact, its breadth and depth within the growing field of interdisciplinary mobilities research. The *Handbook* has chapters from a broad range of methods and applications, with a specific reflexive focus on the analytical purchase enabled and the practical import of applying research in the world. It is divided into four parts (‘Motivations’, ‘Methods’, ‘Applications’ and ‘Reflections’), which we briefly introduce next.

PART I MOTIVATIONS

Part I focuses on the impetus for research, and traces the driving factors such as concerns with sustainability, inequality, social justice, social mobility, activism, transformations of time and space, and many more. The contributions open up new avenues for transdisciplinary research co-creation on these questions:

- What are the urgent questions and burning issues that drive the individual research and motivate the scientists?
- How does this relate to new and emerging research agendas, traditions and perhaps schools that mobilities research is shaping currently?

The authors in this part reflect individually on the ‘why?’ of their own research. The chapters give an insight into the reasons behind their research and their ways of selecting topics, deciding on priorities, and so on. However, they also show the worries behind the research, the ethical and sometimes moral reflections that lead to a specific research agenda and, in consequence, to a specific selection and application of methods and methodologies.

In her opening chapter to the *Handbook*, Mimi Sheller gives an insight into the range of mobility injustices and different levels of studying mobilities. Mobility injustices do not only have an urban scale. They also have a national, a transnational and a planetary dimension, and this chapter describes the emergence of applied mobilities research that seeks to contribute to more sustainable, and just, policies and planning. In addition, it offers an overview of mobile methods, focusing on two different sub-fields of mobilities: cycling research, and migration and border studies.

In the following chapter Malene Freudendal-Pedersen explores and discusses the role of values when we are motivated to do something, with a discussion point being the climate crisis. By reflecting on two prominent figures in the climate debate, Al Gore and Greta Thunberg, the chapter explains how paying attention to everyday life mobilities plays a key role in understanding values as a driving force to do something.

Staying with the discussion of sustainability, Dennis Zuev and Luca Nitschke describe the concept of sustainability, and reflect on some of the paradoxes and contradictions of contemporary mobilities and mobilities research in particular. The chapter supports a critical engagement with mobilities and provides an overview of fields where mobility research should pay more attention to sustainability and environmental consequences in general.

Sven Kesselring focuses on the relationships between mobility research and the current state of the mobile risk society. In particular, he raises the question of how to deal with the massive time constraints climate change puts on societies, organisations, institutions and the individual. This contribution addresses the current transformative process of the system of automobility and the questions of technological fixes and technocentric policy and planning approaches. He puts centre stage the question of whether mobilities research has the time and the right methods to deal with the challenges and necessities of climate change.

By methodologically mobilising the concept of social futures, Monika Büscher demonstrates how we might leverage the deep understanding of the contingent, emergent character of socio-technical, socio-material orders that the new mobilities paradigm enables. Her stories from the 2017 Lancaster Mobile Utopia Experiment explore how we might change the systemic dynamics that create precarity as the condition of our times, connecting attempts to find new ways of sensing this precarity and working with it to create visions of a good life, and contesting what good life might be possible and what ‘good’ might mean, and for whom.

PART II METHODS

Part II focuses on the objects of research and how to create new knowledge about them. It illustrates mobile and multi-method approaches within mobilities research, and presents a

range of methods to gain empirical insights, and collect and measure data on mobilities. This ranges from quantitative, technology-based tracking to qualitative ethnographical approaches. The part puts at the centre of its attention the question: what methods are applicable to deepen our understanding of mobile worlds? Chapters in this part primarily focus on the how of doing research, the concrete application and the handling of connected to specific applications and methods.

Starting this part, Fernanda da Costa Portugal Duarte examines the dynamics of data mobilities and their implications for self-tracking. In her chapter Duarte explores the self-tracking technology Truth or Dare (ToD), and how it turns the biological body into a site of physiological data, and demonstrates how critical making can be applied as a method to investigate protocols of data mobilities.

The following chapter, by Malin Henriksson and Jessica Berg, introduces time-geography travel diaries. They show them as a useful and rich method to study everyday life. By the use of recorded travel activity data researchers can understand and analyse how individuals carrying out and orchestrate travels, include places, structure times, manage meetings with people, and embody experiences, atmospheres and emotions. The chapter provides knowledge on how, when, where and why travel diaries should be used in mobility research, and describes how to design and use time-geographical travel diaries throughout a research process.

On the basis of the research project 'Airport City Futures', Gunvor Riber Larsen presents a triangulatory design of qualitative and quantitative methods and describes the often troublesome venture of performing an analytical reduction of complex realities in practising mobilities.

Staying in the air, Julia M. Hildebrand examines auto-drone technography as a creative and self-reflective mobile method, with the focus on the example of drone-logs; the juxtaposing of sky video with ground audio. The chapter argues that the distant and detached perspective of a drone can complement mobile methods practically and metaphorically.

The use of logging method can be studied in Larissa Schindler's contribution on different versions of logbooks (pre-existing logbooks and solicited logbooks). Her chapter resents logbooks as mobile and explains how logbooks contribute to a profound (multi-method) research design, following the questions: what are logbooks? How can they contribute to our understanding of mobile worlds?

Helena Krobath examines creative methods for exploring relations between space, sensing and knowledge that co-construct place. These sense-based methods focus on listening through personal situative and conceptual frames and embodied practices. Krobath describes how she assembles a situated account of driving in the backwoods of Mission, British Columbia, Canada, iterating emplaced exercises with documentary research and theoretical framing. Through this, she explores features of the road that have come to seem fixed or elemental.

Following the auto-ethnographic practice of driving, Sharon Wilson examines methodological approaches used in a fieldwork of Volkswagen (VW) campervan mobilities, focusing on the phenomena of tourism. Through the chapter, Wilson seeks to contribute to the creative methodological practices by examining their applications in an auto-ethnographic study of driving on the British motorway. Actor network theory (ANT) is used to unpack the VW campervan travel as a mobilisation of many things.

In concluding this part, Konrad Götz and Georg Sunderer explore mobility orienta-

tions, a concept derived from transdisciplinary sustainability research on mobility. Mobility orientations indicate the motivation behind, and the meaning of, mobility and is used to gather information for measures to decouple mobility from automobility. The chapter presents adjacent research and refers to other examples and applications.

PART III APPLICATIONS

Part III focuses on presenting various applied mobile methods in mobilities research and how mobile and live methods creatively address the fact that ‘the mobile flies forever before the pursuit of science’ to intervene in the world (Bergson 1920, p. 317). The part presents different ways of infrastructuring for more richly informed applications of research. A key question is, what are the new learnings when applying mobilities research to the lived world? The chapters in this section are primarily focusing on for whom and with whom mobilities research is undertaken.

Opening this part, Marie Huyghe, Ghislain Bourg and Anaïs Rocci study individual (mobilities) behaviours focusing on the changes in mobility habits encouraged through travel behaviour change programmes. As an important field of mobility in order to reduce our environmental impact, the chapter focusing on voluntary travel behaviour change programmes (VTBC) in France, and through a comparative analysis it provides insight into the trends arising from these operations.

In the following chapter Anita Perkins describes how to apply a mobilities framework for cultural studies of literature. By presenting a multi-layered, three-step analysis approach that attempts to take a cross-sectional view of the context within which the text was produced, the author illustrates this analytical approach. To show how it can bring a fresh perspective to the writer’s textual representations of mobile experience, Perkins analyses Graeme Simsion’s book *The Rosie Project*, where an autistic university professor sets out in search of love.

From an analysis of literature to the analysis of crisis, Stephanie Sodero and Richard Rackham explain the concept of vital mobilities, the movements of goods, people and information that impact life chances in the context of crisis. By extending Adey’s (2010) work on emergency mobilities, vital mobilities is presented as a concept to analyse the context of everyday circulations and their disruption in response to crisis events. Focusing on blood (mobilities) as a literally life-sustaining example of vital mobilities, the chapter discusses two different and disruptive events: the Manchester bombing (2017) and the Filton flood (2012).

In the following chapter, Siiri Silm, Olle Järv and Anu Masso explore the different use and inherent potentials of mobile positioning, which is defined as tracing the location of a mobile phone through time and physical space. As they state in the chapter, more than 5 billion people in the world have a mobile phone, and they explain why mobile phones provide a unique opportunity to study human mobility. The chapter focuses on mobile positioning, respectively passive, active and smart-phone based positioning, as a productive approach to examine the spatio-temporal mobility of people and population dynamics.

For another look into the field of mobile ethnography, Jennie Germann Molz demonstrates how mobile virtual ethnography (MoVE) enables research at the intersections

of embodied mobility and mediated interactions among long-term travellers. Mobile virtual ethnography is a methodological approach that adapts traditional ethnographic techniques to the study of the interplay between travellers online and on-the-road mobility practices, and Molz uses her own field studies to describe the application of MoVE.

Continuing the application of methods to study mobile life, Avril Maddrell explores mobile practices of pilgrimage journeys using mobilities concepts, and mobile methodologies. The exploring of pilgrimage journeys is described as a dynamic embodied process and experience, whether focused on visits to shrines or on pilgrimage routes. The chapter focuses on examining mobile methods of analysing postcards and photo diaries, for an interdisciplinary case study of a pilgrimage project.

In the following chapter Phillip Vannini and Martin Trandberg Jensen examine the value of visual methods and their specific applications and challenges (both quantitatively and qualitatively). They reflect on different forms of visual (video and photography) and art-based approaches (painting, mapping, and so on) to examine the reflexivity and performativity of visual research.

Chelsea Tschoerner-Budde explains and discusses the strength of discourse analysis in relation to identifying and enhancing understanding of barriers and opportunities in shifting mobility policies. Her chapter introduces the application of a discourse analytical approach as a concrete tool for promoting sustainable mobility, illustrated through a case study of sustainable mobility policy-making in the German city Munich.

By introducing examples from planning practices in mobilities projects, for example, the Danish light rail project SMIL, Nina Moesby Bennetsen and Katrine Hartmann-Petersen explain the valuable learnings from investigating the links between dynamics in everyday life and the mobilities planning processes. They argue how it offers an understanding of how new mobilities policies can create urban tipping points for innovation in strategic work with mobilities policies in practice. With the use of examples of planning practices, the chapter emphasises how mobilities planning can gain from new ways of organising planning processes, based on knowledge that is taken for granted. Rapid innovations in smart technologies have a wide impact on contemporary and future mobilities.

Anthony Elliott and Ross Boyd examine the profound impact of artificial intelligence (AI), advanced robotics and accelerating automation, arguing that fast innovation of smart technology requires a rethinking of mobilities research. To examine this impact, they explore what they refer to as mobilities 3.0, the interconnections among intelligent machines and digitalised subjects which are on the move and AI in relation to military systems. Digitalisation has a profound impact on the convergence (annihilation) of space through time, and connectedness is no longer a matter of physical distance.

Exploring personal time–space compression and distanciation, Earvin Charles Cabalquinto examines practices of maintaining long-distance relationships enabled through digital communication technologies. Critical application of a range of methods allows him to study how expatriate Filipino workers stay in touch with their left-behind loved ones, and unpacks and articulates these families' lives on the move.

Continuing in the research on mobile family relations, Lesley Murray explores families as key sites of social relations for understanding mobilities. Murray takes a critical mobile perspective on what defines families and highlights a range of mobilities research methodologies and methods applied to family, to contribute to an understanding of family mobilities and of mobilities through family.

Concluding this part, Thomas Birtchnell and Tillmann Böhme introduce a brief history of cargo. As they state, cargo has a significant influence on what makes societies and economics in the twenty-first century. In the chapter they explore the overlap between mobilities research and these fields grounded in business and supply chain management, to present an ontological shift that this intersection between paradigms shapes.

PART IV REFLECTIONS

The final part returns to some of the above questions and reflects upon the bigger picture of methods and methodologies of mobilities research and its varied applications. Aiming to understand and perhaps change mobilities futures, reflections on the impact and use of specific foci is essential for a mobile, live methodology and epistemology. Based on the questions ‘what are the gains and losses in specific methods and applications for mobilities research?’ and ‘what futures are envisioned and enacted?’, the chapters in this part are primarily focusing on what we are doing when engaged in mobilities research.

Opening this part, Alexander Paulsson, Fabio Hirschhorn and Claus Hedegaard Sørensen examine how mobilities studies can be further connected to futures studies, by introducing the Delphi method. The Delphi method represents a method of future studies and is characterised by asking experts through controlled iteration processes. The chapter explores the method and how it is applied in two mobility-orientated cases, and emphasises the importance for mobilities studies to learn from methods in futures studies.

Claus Lassen takes us back to the airport as a key site for mobilities research. He reflects upon, and addresses, different methodological and applied dimensions of airport research. An airport provides the opportunity to study several issues related to mobilities, and Lassen explores which challenges researchers face in studying airports. Outlining approaches, techniques and tactics that can be used in order to overcome these challenges, he suggests two ideal type approaches for future airport studies: the trust approach and guerrilla approach.

Literally running with mobilities research, Kai Syng Tan sets out to explain and explore how the concept and practice of running can allow insight into the mobile constitution of reality. She asks, in what ways could ‘running art-fully’ spark flights of thought for us to study ourselves? The chapter is divided into ten runs (sections) in which Tan unfolds ways to extend current understanding and practice in how mobilities research entangles with art and running.

Following the interest for creative methods in mobilities research, Kaya Barry introduces creative arts practices and explores the intersections of creative arts and mobilities research, to highlight the capacity of creative methods for studying mobile lives. As a method for mobilities research, creative arts practice is presented as a process in which experience, sensation and the embodied doing of research comes to the fore. Reflections on methods and applications of mobilities research vary greatly, from studies of airports and creative arts to the study of video games, as presented in the next chapter.

Lewis Charles Smith seeks to understand how the video-game genre of simulators can be used to preserve past, present and future mobility subjects, objects and scapes. The chapter aims to build a case for using simulation as a way of preserving and archiving contemporary and past mobilities, ready for education, research or development. It

approaches this by exploring on one of the most popular simulators, Train Simulator 2019, a game which translates the experience of train driving.

Samuel Thulin's chapter introduces resonance as a mobile phenomenon and as a way of approaching mobilities research, starting by exploring how resonance has been conceptualised. Resonance is defined as amplification and damping of specific frequencies of oscillation through vibratory interaction. The chapter explains how resonance contributes to mobilities research by paying attention to how vibrations travel between various bodies and materials, and beyond the realm of physics.

David Tyfield introduces phronesis, situated strategic-ethical wisdom, and argues how a methodological realignment of mobilities and phronesis plays an important role in learning to do complex system government well. The chapter gives an inside view of the methodological paradigm shift that phronesis enacts, in ways of thinking and of doing research. A special focus is on how each of the terms of its definition – situated, strategic, ethical and wisdom – are necessary elements for cultivation of the new relations to knowledge.

In their chapter Ole B. Jensen, Andrea Victoria Hernandez Bueno, Shelley Smith and Cecilie Breinholm Christensen apply design thinking and interventions as a method. They look at mobile situations on two different sites, an airport and a metro, and illustrate their methods of this situational research analysis from the outside (observations, camera tracking, and so on) and from the inside (eye-tracking, interviews, and so on). The chapter contributes another exploration of how mobilities is more than movement from A to B.

As part of the mobility turn, critical mobilities research has come to the fore. In her chapter, Katharina Manderscheid explores two central understandings of doing critical mobilities research; (1) mobilities as critique (constitutes a general critique of traditional social research) and (2) critique of mobilities (moves the focus onto the power/knowledge aspect of mobilities), and she reflects on what they imply in relation to methods and methodologies.

With their ethnographical work in mobilities research, Maja de Neergaard and Hanne Louise Jensen engage with embodied ethnography, focusing on the affective, sensory and emotional modalities of human mobile practice. The chapter reflects on ethnographical research that involves moving with the phenomenon of study, what the authors conceptualise as embodied mobile ethnographies. From this research, they discuss how the body plays different roles and the gains this methodological development has accomplished.

Rodanthi Tzanelli examines urban mobilities with the use of technology, by discussing synaesthesia (research epistemologies for urban environments) and performative synaesthetics, the embodied methodological means for such research. Focusing on describing the significance of encapsulating affective and pre-cognitive apprehensions of the field-world, Tzanelli demonstrates (performative) synaesthetics in practice by taking us for a drive (walk) in the Greek town Thessaloniki.

As the concluding chapter of the part as well as the *Handbook*, Bronislaw Szerszynski takes us on an explorative geophilosophical bus tour for a story of the Earth. By analysing the mobile entity of a bus from departure to arrival, Szerszynski demonstrates how planetary mobilities can work as a method. On this bus tour, the chapter outlines several questions that can help analyse mobile entities and the way they are situated in the systems of the Earth.

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