Mobile Technologies of the City

Edited by
Mimi Sheller and John Urry

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Mobile Technologies of the City

Mobile communications technologies are joining new systems of urban transportation, surveillance, scheduling and sorting to quietly but dramatically change the social, architectural and infrastructural fabric of cities across the world. Urbanism has always been in flux, but now more so than ever, as many aspects of economic and social life are increasingly conducted 'on the move' or away from 'home'. Emergent forms of physical and informational mobility are changing and influencing patterns of movement, co-presence, social exclusion and security across many urban contexts.

In *Mobile Technologies of the City* Mimi Sheller and John Urry bring together a carefully selected group of innovative case studies that trace the emergence both of the new socio-technical practices of the city and of a new theoretical paradigm for mobilities research. The research based in Vienna, Liverpool, Bristol, London, Tokyo, Paris, Los Angeles and Hong Kong ranges across media including guidebooks, web sites, train schedules, wireless computing, cinema, mobile phones and mobile gaming. It encompasses infrastructures such as road and rail systems, airline networks and hubs, internet routers and wireless 'hot spots', and focuses on urban sites including streets, train platforms, bus stops, airports, internet cafés, park benches, parking garages and cars.

Mobile Technologies of the City contributes new theoretical perspectives on temporality, security and systematization. It brings together complexity theory, actor network theory and social studies of technology generating a new approach to the mobility systems that constitute contemporary cities.

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CONTENTS

Contents

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Introduction: Mobile Cities, Urban Mobilities

Mimi Sheller and John Urry

Introduction

Cities are mobile places and places of mobility. Many cities were built at the convergence of major waterways and overland routes, and later became hubs for railways, highway systems, air transport and multi-modal metropolitan transportation systems. Mobility has been built into the infrastructure of cities, including the momentary immobilities of ports and freight depots, parking spaces and garages, airports and subway stops. 'Enlightened planners wanted the city in its very design to function like a healthy body, freely flowing . . . the Enlightenment planner made motion an end in itself' (Sennett 1994: 263–4). By the early twentieth-century the Chicago School urban theorists described mobility as 'perhaps the best index of the metabolism of a city' (Burgess 1925: 59). And today a 'new urbanism' emphasizes 'understanding cities as spatially open and cross-cut by many different kinds of mobilities, from flows of people to commodities to information' (Amin and Thrift 2002: 3); 'cities and urban regions become, in a sense, staging posts in the perpetual flux of infrastructurally mediated flow, movement and exchange' (Graham 2004: 154).

The constant flow of ships, ferries, horses, wagons, trains, trams, omnibuses, bikes, cars, planes, helicopters, underground metros and pedestrians has given the city its physical 'metabolism' (as interestingly shown in the case of nineteenth-century Singapore: Wong 2006). Cities also have an informational metabolism, having historically served as commercial hubs in which there was a density of informational flow concerning prices, arrivals and departures, availability of commodities and goods. Alongside this they functioned as centres of media and publicity with a density of meeting places, newspapers, leaflets, libraries, advertising posters, billboards and loudspeakers. Today such information flows, in part, take digital form, flowing through the dense urban

infrastructure of coaxial and fibre optic cable, radio towers and satellite dishes, visual display units and, increasingly, WiFi protocols. Such flows – and the systems to control, channel and direct them – constitute cities as transnational entities made up of complex encounters, connections and mixtures of diverse hybrid networks of humans and animals, objects and information, commodities and waste (see Amin and Thrift 2002; Castells 1989, 1996).

Cities are also, of course, crucial sites for the arrival and departure of migrants, whether rural to urban movement within a nation-state, linear migration from one state to another, or the circular relocations and movements of 'transmigrants' and 'tramps' (Cresswell 2001). Diverse populations have long flowed into and out of cities, and continue to do so at a larger scale and with increasing rapidity. Tourism and business travel are also largely focused on cities, which serve as key arrival and departure points, meeting and conference centres, and tourist destinations in their own right (see many chapters in Sheller and Urry 2004). The attraction, management and surveillance of such flows and associated border controls has become one of the paramount concerns of urban governance and policing. And associated with the movements of populations come concerns about the movements of disease, from tuberculosis, HIV and SARS to foot-and-mouth, chicken flu and other disease vectors (see Little, this volume, and Law 2006). Fears generated by terrorism are also frequently associated with the mobility of people (and bombs) in and out of cities (as various papers in Sheller and Urry 2006a, show). Thus urban mobilities are not unlimited but are striated by 'a whole series of rules, conventions and institutions of regulation and control . . . a systematized network' (Amin and Thrift 2002: 26). Mobility is always 'differentiated' and ideologically enacted in processes of social, cultural and geographical power (Cresswell, forthcoming).

Urbanism, in sum, has always been associated with mobilities and their control, and continues to be so more than ever. The technologies, infrastructures, material fabric and representational machinery of cities support these mobilities, while also being shaped and re-shaped by them (see also Sheller and Urry 2000). As Stephen Graham has argued:

> the new hybrid interchanges of mobility and flow, as ICTs fuse with, and reconfigure, the other mobility spaces and systems of urban life, become critical and strategic sites at which the very political organization of space and society becomes continually remade.
>
> (2004: 155)

It is our contention in assembling this collection of essays on mobile technologies of the city that emergent practices of physical, informational and communicational mobility are reconfiguring patterns of movement, co-presence, social exclusion and security across many urban contexts. In particular, this book examines the interplay of physical mobility and mobile communications in the making of urban spaces, technoscapes and encounters.[1]

The aim of this volume is to bridge the gap between studies of physical mobility (e.g. transportation, migration, tourism studies) and informational mobility (e.g. the internet, media and mobile telephony), and in so doing to trace the emergence both of new socio-technical practices of the city and of a new theoretical paradigm for 'mobilities research'.[2] Many aspects of economic and social life are increasingly conducted 'on the move' or away from 'home'. In the convergences, conflicts and negotiations over physical mobilities and informational technologies urban futures will be determined. In a mobile world there are extensive and intricate connections between physical travel and modes of communication that seem to be forming new fluidities that are difficult to stabilize. Stabilizations of urban form are precarious, with new performances and representations of urban space often emergent, and with mobile communications technologies now assisting in the transformation of urban architectures, infrastructures, images and commodified value. Material changes in the technologies and infrastructures of urban life appear to be 'de-materializing', as connections, encounters and forms of co-presence are made and re-made in cities 'on the move'.

There are many studies of mobile communications and of urban transport systems, but very few that address the interplay between mobile communications, physical mobility and the city. A contemporary analysis of the relation between these systems, infrastructures and practices must be informed by recent theoretical developments in mobility studies, complexity studies, cultural geography, urban studies, cultural studies of technology, science studies and feminist studies of technoscience. These new theoretical approaches can contribute to re-thinking how emergent socio-technologies are re-shaping cities, urban form and space, while also enabling new forms of (im)mobility, subjectivity and encounter.

Much recent work on 'mobilities' tends to address a general condition of 'liquid modernity' (Bauman 2000) at an abstract theoretical level with little sense of the particularity of urban practices and the locatedness of mobilities at different scales (see Cresswell, forthcoming). In contrast, we address specifically located material practices as sites in which particular kinds of mobility and mobile communication have shaped or are re-shaping space, place and presence. Influenced by the material turn in European cultural geography and cultural sociology – which has made objects, infrastructures and physical 'stuff' an equal partner in the fabrication of socialities and technologies of co-presence – *Mobile Technologies of the City* aims to make mobilities, immobilities and their representations (in discursive, informational, visual and virtual form) central to contemporary urban studies. The specific case studies here involve Vienna, Liverpool, Bristol, London, Tokyo, Paris, Los Angeles and Hong Kong. They range across media including guidebooks, web sites, train schedules, WiFi, cinema, mobile phones and mobile gaming devices; and urban sites including streets, train platforms, bus stops, airports, internet cafés, park benches and cars. And they encompass infrastructures such as road and rail systems, airline networks and hubs, internet routers and wireless 'hot spots'.

The field of urban studies has mostly not addressed the impact of new technologies of mobile communication on reconstituting urban space (although see Amin and Thrift 2002; Crang 2000; Graham 1997, 2004; Moss and Townsend 1999; Townsend 2000). The strong and rich tradition of neighbourhood studies and place-based ethnography has in some ways limited the horizons of urban studies to what can be seen 'on the streets'. Deep immersion in a particular urban setting offers one perspective on urban life, but it also remains 'sedentarist' in its ontology (see Sheller and Urry 2006b), fixing urban space as a kind of bounded geographical location into and out of which people and objects move, but which has a kind of givenness. Instead, we need to ask: How are cities being de-materialized and re-materialized through new kinds of urban logics, technical systems and discursive orderings? How are new infrastructures transforming urban practices and the cultures of city life? How are new forms of virtual connectivity, including not only 'cyberpublics' but also innovations in mobile telephony and geo-located mobile gaming, reconfiguring urban encounters, and thus transforming the very 'stuff' of cities and citizenship? How are the pressing questions of security, violence, fear and terror that many urban polities face today being translated into new infrastructures of mobility, surveillance and selective immobility, or more precisely 'demobilization' (see Sheller 2004a; Verstraete 2003; Kaplan 2003; Graham and Marvin 2001; Graham 2004; Cresswell, forthcoming)?

Studies of new communication technologies in what is described as a 'wired world' offer one entrée into this subject, yet tend to ignore the physical mobilities of people and things, which intersect with the 'virtual' mobilities of communication. Dearnley and Feather's *The Wired World* (2001), for example, links the concept of the wired world to ideas of 'the information society' and the 'knowledge-based economy', and in doing so ignores questions of place, materiality and physical mobilities. Other edited collections have explored the emergence of 'networked societies' by focusing on 'cyberspace' and the internet. Armitage and Roberts' *Living with Cyberspace* (2002), for example, emphasizes new ways of understanding speed and space, but does not link this specifically to urbanism and questions of physical mobility. Many of the contributors to this volume, in contrast, pay close attention to the interplay of physical and informational mobilities and connectivity through studies of specific sites such as airports, mobile telephony devices, or wireless infrastructures. In doing so they also emphasize the importance of temporalities, and offer new perspectives on the making of place through the temporal coordination of mobilities.

Other strands within urban studies attend to specific developments in technologies of transportation, communication and surveillance within emergent 'digital cities' (e.g. Gandy 2002; Ishida and Isbister 2000; Tanabe *et al.* 2002; Bishop *et al.* 2003), but often fail to integrate these into a wider theoretical perspective on mobility and urbanism. Some work on 'CyberSociety' (Jones 1995) or 'Cyberdemocracy' (Saco 2002), includes an analysis of spatiality and community, but again without highlighting questions of complex mobilities/ immobilities. The work of Barry Wellman and his co-researchers has most

consistently focused on the interplay between physical and virtual mobilities, focusing on the internet 'not as a special system but as routinely incorporated into everyday life' (Wellman and Haythornthwaite 2002: 6; see also Light 1999). The internet users most often addressed in these collections, however, are sedentary (either home-based or work-based) rather than the mobile users of various technologies (including both communicational and transportational) that is our focus in *Mobile Technologies of the City*. This volume thus offers one of the first empirically rich and theoretically informed explorations of mobile technologies that are only just coming into widespread use (see Funk 2004 for a more technical appraisal of the mobile internet market) and are beginning to restructure urban space and practice.

The field of transportation studies, where one might expect greater attention to questions of mobility and urban form, is in general not very theoretically informed (assuming a kind of positivist empiricism as common sense) and has missed out on many of the most interesting questions that this volume will address (see Sheller and Urry 2000, for a critique). As we have argued elsewhere, sociology's view of urban life failed to consider the overwhelming impact of the automobile in transforming the time-space 'scapes' of the modern urban/ suburban dweller. Industrial sociology, consumption studies, transportation studies and urban analyses have each been largely static, failing to consider how the car reconfigures urban life, with novel ways of dwelling, travelling and socializing in, and through, an automobilized time-space (see Sheller 2004b, and forthcoming). The socio-technical system of petroleum-based transportation infrastructure is not only a key form of contemporary mobility, but is, furthermore, interconnected with other mobile systems that organize flows of information, population, petroleum oil, risks and disasters, images and commodities (Sheller and Urry 2005, 2006).

Many mobility systems constitute and make possible cities. We turn, then, to a brief discussion of urban mobility as a system of intersecting systems, before giving an overview of the main lineaments of the book.

Urban Mobility Systems[3]

Through diverse studies of urban mobility systems we hope this volume will contribute to new theoretical perspectives on temporality, security and systematization. Each of the intersecting 'mobilities' that we have introduced above presupposes a 'system' (in fact, many such systems). These systems make possible movement and thus they make possible the city: they provide 'spaces of anticipation' that the journey can be made, that the message will get through, that the parcel will arrive. Centrally important here are systems that permit predictable and relatively risk-free repetition of the movement in question. In the contemporary city these systems include those of ticketing and licensing, oil and petroleum supply, electricity and water supply, addresses and postal systems, road safety and public safety, protocols, station interchanges, web sites,

money transfer, luggage storage, air traffic control, barcodes, bridges, time-tables, CCTV surveillance and so on.

The history of these repetitive systems is, in effect, the history of those processes by which the natural world has been 'mastered' and made secure, regulated and relatively risk free. For people to be able to 'move', and for them, in turn, to move objects, texts, money, water, images, is to establish how it is that nature has been subdued (on nature, see Macnaghten and Urry 1998; Latour 2004). There is a metabolism that is effected by human societies over the physical world especially through developing and spreading diverse 'mobility-systems', and cities have been one of the central achievements of that mastery – a key symbol of both the pinnacles of civilization and the destruction of the natural world.

Historically many of these currently significant systems date from England and France in the 1840s and 1850s. Their interdependent development defines the contours of the modern mobilized world that brings about the 'mastery' of the physical world. In mid-nineteenth-century Europe nature gets dramat-ically and systematically 'mobilized'. Systems dating from that exceptional moment include a national post system (the Penny Post), the invention of photog-raphy and their use within guide books (Daguerre in France, Fox Talbot in England), the first railway age and the first ever national railway timetable (Bradshaws), the first city built for the tourist gaze (Paris), the first inclusive or 'package' tour (organized by Thomas Cook), the first scheduled ocean steamship service (Cunard), the first railway hotel (York), the early department stores (in Paris), the first system for the separate circulation of water and sewage (Chadwick in Britain) and so on. Across the colonial world in the mid- to late nineteenth century people also witnessed (and contributed labour to) the building of roads, canals, railways, ports and systems for the regional and world-wide shipment of goods and people, usually via burgeoning colonial port cities. Morse code, the telegraph and then the telephone were developed during the latter years of that century.

The twentieth century then of course saw a huge array of other 'mobility-systems' develop, including the car system, national telephone system, air power, high-speed trains, modern urban systems, cheap air travel, mobile phones, networked computers and so on. Virilio maintains that systems are increasingly developed in which there is an obligation to be circulating, and this is true of water, sewage, people, money, ideas (1986). Circulation is a powerful notion here that has many impacts upon the social world. There is in the modern world an accumulation of movement analogous to the accumulation of capital – accu-mulations of repetitive movement or circulation made possible by diverse, interdependent mobility systems (see Thrift on 'movement-space', 2004) And as we move into the twenty-first century these 'mobility systems' are developing some novel characteristics, traced out more fully in Urry (2006).

First, such mobility systems are more complicated, made up of many more elements and based upon an array of specialized and arcane forms of expertise. Mobilities have always involved expert systems but these are now

highly specific, many being based upon entire university degree programmes and specialized companies. Second, such systems are much more interdependent with each other so that individual journeys or pieces of communication depend upon multiple systems, all needing to function and interface effectively with each other. Third, since the 1970s, systems are much more dependent upon computers and software. Software we might say, paraphrasing Thrift (2001), writes mobility. There has been a massive generation of specific software systems that need to speak to each other in order that particular mobilities and 'sortings' take place. Pervasive computing produces a switching and mobility between different self-reproducing systems, such as the internet with its massive search engines, databases of information storage and retrieval, world money flows especially through the ubiquitous 'spreadsheet culture', intelligent transport systems, surveillance systems and so on. Fourth, these systems have become especially vulnerable to what Perrow terms 'normal accidents', accidents that are almost certain to occur from time to time, given the tightly locked-in and mobile nature of many such interdependent systems (1999; see Law 2006).

Such increasingly complex, computerized and risky systems are central to new urban forms and practices, and to the lives of city dwellers. As daily and weekly time-space patterns in the richer parts of the world are desynchronized from historical communities and place, so systems provide the means by which work and social life can get scheduled and rescheduled. Organizing 'co-presence' with key others (workmates, family, significant others, friends) within each day, week, year and so on becomes more demanding with this loss of collective coordination. 'Clusters' dissolve into what Wellman terms 'personalized networking', a person-to-person connectivity most revealed now with those machines that enable immediate, mobile connectivity (2001). The greater the personalization of networks, the more important are systems to facilitate that personalization. There is a spiralling, adaptive relationship effected through 'scheduling systems', while of course much of the world's population are unable to participate in a life on the move and are thereby more socially excluded; or they are subjected to movements against their will, or else find their mobilities involuntarily delimited by passports and visas, border-guards and detention centres, and what some call the 'prison-industrial complex' (Sudbury 2004; and see Ahmed *et al.* 2003).

With de-synchronization the use of scheduling becomes more necessary. There is an increasingly 'do-it-yourself' scheduling society commonplace in at least large cities across the world. And the greater the personalization of networks, the more important are systems to facilitate that personalization. There are irreversible changes taking place that are moving social connections towards person-to-person networks requiring specific personalized scheduling systems in order for life on the intermittent move to take place. And those systems are especially necessary as system risks and failures abound and arrangements need to be endlessly renegotiated. Networks are on occasion tightly coupled with complex, enduring and predictable connections between peoples, objects and technologies across multiple and distant spaces and times (Murdoch 1995: 745;

Law 1994: 24). Things are made *close* through these networked relations, and both *closeness* and *distance* are made or unmade, rather than being simple objective measures of geographical placement.

What implications do these changes have for the wider fabric of urban infrastructure and urban life? Graham and Marvin's *Splintering Urbanism* (2001) especially pays attention to questions of exclusion, disconnection, bypassing and differentiation that are central to thinking about mobilities and their implications (and are further explored by Wood and Graham in this volume). Crucial here are questions of civic participation, social exclusion and the transformation of urban public spaces, which we explore below in terms of transformations in the systems supporting co-presence and mobilities. Personalization, ineluctably, comes with systems of sorting, tiering, channelling, and differentiating access for 'preferred customers'. Third-generation wireless communication systems in the US, for example, claim to offer 'ubiquitous' and 'instantaneous' communications for business customers moving across a world of seamless high-speed connections enabled by expensive devices (Schiesel 2005), but such premium services are predicated on the dismantling of the ideals and infrastructures of universal access that once underpinned the public utilities and the social inclusion of the entire 'public' in urban public space.

New urban transport infrastructures are also being built and planned mainly to better service the business customer or to stimulate corporate investment in specific urban areas while bypassing others. From the Docklands light railway and successful congestion charging scheme in London, to huge infrastructural developments in Malaysia, Singapore and China (Graham and Marvin 2001), large-scale, new urban transportation projects have been promoted as good for business, good for tourism, and good for increasing circulation through congested city centres. In New York various interest groups and speculators are jockeying for position as multiple plans are floated to redevelop the urban transport infrastructure.[4] All of these potential projects are linked to visions of the informational infrastructure of the future, to projections of the desirability of increased 'mobility' as a public good, and to media representations of ideals of urban mobility – even when their realization will inevitably exclude, bypass, and lead to disinvestment in other geographical areas.

In many ways, then, the reconfiguration of complex mobility and communication systems is not simply about infrastructures but the refiguring of the public itself – its meanings, its spaces, its capacities for self-organization and political mobilization, and its multiple and fluid forms (see Sheller and Urry 2003; Sheller 2004c). In the following section we introduce some further key concepts and provide an overview of the sections and chapters of the book.

Overview of the Book

We employ the notion of 'technoscapes' to explore emergent socio-technologies and their spatial forms. Technoscapes is a term drawn from the work of Arjun

Appadurai and also John Urry's more general concept of 'scapes'. As it is used here it builds on the notion of 'landscape' as a simultaneous representation *and* shaping of land and space. We can think of landscape as a combination of social scripts, cultural values, and material rearrangements of physical elements (trees, lakes, buildings, walkways, canals, etc.) that organizes views, viewers, space and the elements within it (vistas, viewpoints, landmarks, etc.). Subjects move through a socially structured landscape and thus help to perform that landscape, but landscapes also afford or perform certain kinds of subjectivities. Landscapes are imbued with power, enabling particular forms of domination and subordination marked out in sites such as central squares, military fortifications, imposing façades and gates, urban skyscrapers or rural landholdings marked out with parkland, tree-lined drives or architectural landmarks.

Technologies also work in this way, and we describe this work as a 'technoscape'. The concept of technoscape serves to emphasize that contemporary landscapes are shot through with technological elements which enrol people, space, and the elements connecting people and spaces, into sociotechnical assemblages – especially the transportational technologies, such as roads, rail, subways and airports, but also the informational technologies such as signs, schedules, surveillance systems, radio signals and mobile telephony cells. People move through these technoscapes whenever they ride in a train, make a phone call, read a computer screen, simply step off a pavement to cross a road, or hike on a marked trail. Data, pictures and sounds also flow through technoscapes (implying both an infrastructure and a set of practices through which people access such flows).

A technoscape is also associated with a range of equipment that enables the production and consumption of space: a car, a mobile phone, a camera, a screen, a hiking boot and so on. Law argues that 'what we call the social is materially heterogeneous: talk, bodies, texts, machines, architectures, all of these and many more are implicated in and perform the social' (Law 1994: 2; and see Law 2006). From science and technology studies we take the idea that architectures, machines and texts enable or 'afford' the possibility for certain kinds of mobilities and immobilities. Human, non-human and inhuman agents interact via the affordances of the spaces, infrastructures and technologies in and through which they move, pause, dwell and encounter one another. 'The rhythms and motions of these inter-corporeal practices', suggests Whatmore, 'configure spaces of connectivity between more-than-human life worlds; topologies of intimacy and affectivity that confound conventional cartographies of distance and proximity, and local and global scales' (Whatmore 2002: 162; and see Clark 2001 on 'trans-human' interchanges in the metropolis).

Like a landscape, a technoscape also performatively produces particular subjectivities (such as 'the driver', 'the pedestrian', 'the hiker', etc.). Several of the contributors here (Spring, S. Jain, Mackenzie, Licoppe and Guillot) carefully investigate not only the technologies of mobility, but also the technologies of imagining, fantasizing and representing mobility as a desired good, and in particular how these imaginaries are linked to urbanism. 'People and places

script each other', argue Amin and Thrift (2002: 23), and 'cities are intensely visualized through images of one sort or another', including tourist maps, city guides, aestheticized districts, architectural signatures, media and film. Through these conglomerations of communication, representation and naming, places enrol, arrange and include or exclude people, while people perform places through imaginaries.

The term 'imaginaries' refers to 'the French idea of the imaginary (*imaginaire*), as a constructed landscape of collective representations, which is no more and no less real than the collective representations of Emile Durkheim, now mediated through the complex prism of modern media' (Appadurai 1996: 73). Accordingly, Ulrike Spring (this volume) shows how the city guidebook shaped the urban form of nineteenth-century Vienna, acting not only as a representation of the city and a script for moving through the city, but also as a kind of blueprint for urban design. And Adrian Mackenzie (this volume) calls for an 'urban new media studies' that would 'analyse the mutual contextualization of images of movement and movement itself, particularly when movement itself becomes an image'. The technoscape and the mediascape therefore work together to produce urban forms, urban imaginaries and urban subjects of particular kinds.

The contemporary technoscape has its own genres of visual representation, especially the cinematic narrative and the commercial advertisement, which are deeply co-constituted with and by the technologies of mobility and communication. Sarah Jain (this volume) argues in an analysis of BMW advertising, that 'how the car works as a commodity, and particularly through its materiality as a *mobile* commodity, is necessary to understanding the urban form'. Urban form (especially in Los Angeles) is shaped by the car's violent 'taking of space', she argues, and this is celebrated and perpetuated by the celebrity culture attached to luxury commodities such as the BMW. Christian Licoppe and Romain Guillot (this volume) further observe how the representation of futuristic urbanism in films such as *Blade Runner* and *The Matrix* (whose urban aesthetic is based in part on districts of modern Tokyo) influenced the design of mobile games, and the playing of these games in turn has the capacity to transform urban space and forms of encounter in cities such as Tokyo.

Thus, the interplay between 'the real' and 'the virtual' involves complex interactions and feedback effects. First, representations of mobility and iconic mobile commodities influence the actual urban form, aesthetically and kinaesthetically, in terms of their design, form and capabilities; second, movements through space are scripted to perform urban space according to the dominant genres, rules, architectures and infrastructures; but, third, on-the-ground implementations of the new technologies of mobility and communication nevertheless have the potential to transform cities both through their power to re-make or re-deploy visual representations of urban form and through their inadvertent openness to the improvisations by which people enact the city. Designers, likewise, must create mobile artefacts that generate profit for business through their

desirability and use, but they must also recursively respond to the actual ways in which people use the objects and software that they design (Licoppe and Guillot, this volume). Mobility systems (and hence cities) are therefore always dynamic, emergent and open to invention despite being rooted in the cultures of capital, commodification, surveillance and control.

Technologies do not produce necessary effects (i.e. technological determinism), but are part of the bundle of actants through which agency is scripted, produced, enacted, contested and repeated. Indeed, new transport technologies are often very slow in their uptake (see Pooley *et al.* 2006), while in other cases the accumulation of small repetitions – as with the growth of mobile phone use or communications between offices using faxes – can lead to a 'tipping point' in which an entire system is transformed, it seems, overnight (Gladwell 2000). Thus, the contributors to this volume pay close attention to the mundane ways people actually use technologies, the manners in which designers implement and adapt devices and systems, and how infrastructures are culturally as well as technically embedded. As Amin and Thrift put it: 'Each urban moment can spark performative improvisations which are unforeseen and unforeseeable' (2002: 4).

The chapters in Part I, Mobilities and the Creation of Urban Spatial Form, offer sophisticated cultural analyses of the creation of urban form in relation to fantasy, representation and commodification. This section underlines the crucial role of mobilities in the framing of urban space, and the ways in which space and mobility intersect with narrative and imaginary representations of the city. Concerns with the interrelation of representation and spatiality are not new to urban studies, dating at least to Walter Benjamin, but the contributors here pay special attention to the generative effects of technologies of mobility (guide books, airports, cars) as they collude in representational practices (city images, web sites, film) and in the service of cultures of enterprise (tourism, internet start-up businesses, advertising).

In Chapter 2 Ulrike Spring considers how guidebooks and sightseeing tours introduced new ways of experiencing the city of Vienna in the nineteenth century, and shows how new practices of walking through the city were interrelated with material changes in the urban form. Infrastructural improvements, new kinds of public spaces and new urban spatial narratives paved the way for what is now contemporary mass tourism. This chapter illustrates how novel approaches to mobility study can be applied to historical cultural studies as well as to contemporary analyses.

In Chapter 3 Peter Adey and Paul Bevan examine how space has become reorganized, recombined and permeated by technologies of extended virtual connectivity (producing what they call 'technospaces'). They use empirical case studies of an internet web site and a regional airport, both based in the Liverpool (UK) area, to explore the connectivity of physical and virtual 'cyber-mobilities'. This chapter offers a well-grounded empirical analysis of two key sites (airports and the internet) that are central to contemporary claims about changing mobilities.

And in Chapter 4 Sarah Jain analyses the co-constitutive relation between violence, automobiles and the US American urban form, including the place of fantasy (in the form of a short film directed by Guy Ritchie, starring Madonna, and appearing on the BMW web site) in promoting the car as a vehicle for making and taking space. Jain argues that an understanding of the materiality of the car as a mobile commodity is necessary to understanding contemporary urban form, and the violence that underlies it. With a US-focus and a high-profile star as its subject, this chapter brings mobility studies into conversation with media studies and a sophisticated cultural political economy.

The chapters in Part II, Re-configuring Co-presence, examine how new configurations and coordinations of physical mobility with communications technologies are producing new social practices of travel and new system-atizations, along with changing exclusions and risks. These case studies suggest some of the ways in which the field of transport studies is being challenged by new informational mobilities and their effects on time-space planning, prediction and risk. Co-presence refers to face-to-face or in-the-same-place encounters of a person with another person, a place, an object or an event. The terms 'virtual reality' or 'cyberspace' are often used to refer to mediated non-physical presences, but they carry many implications and valuations about the status of 'reality' and 'real space' versus 'simulacra' and 'simulations'. 'Co-presence' is meant as a more neutral description of encounters in the physical world, without any implicit assumptions about the ontological difference between the real, the imaginary, the virtual, the simulated, etc., since it is precisely their relation which some chapters in this book will explore. Insofar as 'the actual and the virtual constantly inscribe each other' (Amin and Thrift 2002: 119) how do these inscriptions channel mobilities and immobilities?

In Chapter 5 Juliet Jain draws on research undertaken with a variety of transport organizations to examine how the ability to deliver personalized travel information to people on the move is reconfiguring mobility practices involving the combined use of mobile technologies and existing infrastructures of the British national rail network. She brings to the fore issues of timing and scheduling, which are central to theorizing urban mobilities. Attention to a public transport system helps to counter the overwhelming tendency to focus on individualized representations and accounts of 'business class' mobility in the commercial sector and mass media.

Chapter 6 is concerned with methodologies for assessing the impact of virtual mobility, via the internet, upon personal travel and social participation. Susan Kenyon shows how 'accessibility diaries' (used in a study in the south-west of England) might be used to explore issues of mobility-related social exclusion. This chapter contributes to debates about the interaction between virtual mobility and physical mobility not only by devising a robust empirical instrument for exploring the 'substitution' hypothesis, but also by connecting 'accessibility' to issues of social exclusion. It is also relevant to the development of more 'mobile methods' to investigate the new questions being raised by mobilities research (see Sheller and Urry 2006b).