Urban Machinery

Inside Modern European Cities

edited by
Mikael Hård and Thomas J. Misa

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1 Modernizing European Cities: Technological Uniformity and Cultural Distinction

Mikael Hård and Thomas J. Misa

Between Portugal and Poland, and maybe even further eastward, the national societies of Europe have never been more alike than today.
Osterhammel (2002, 71)

Citizens, planners, and policymakers confront a world where Poland and Portugal, once separated by politics, economics, and culture, seem to be pushed forward to a common destiny by the unstoppable forces of modernity and global markets. Most of the world in fact appears to march down a similar boulevard. To comprehend why, we often incline to the popular notion that technology and capitalism are the driving forces, with the Internet and the global markets it sanctions being just the latest of the ''machines that change the world'' (Womack, Jones, and Roos 1990). Industrialization, modernization, globalization, and urbanization allegedly impose homogeneity on society. McDonald's, the archetype of a rigidly standardized consumer product no less than Henry Ford's Model T was in its time, is found in cities all over the globe. Skyscrapers, the preeminent symbol of modern financial capitalism, are going up in once-communist Shanghai. Will all corners of the world, not only the so-called global cities, be dragged into the maelstrom of global capitalism? How much room, if any, do we as citizens have to create alternative paths in this modern world?

Today, Europe is a test case that, if closely examined, can yield valuable insights about meeting the threat of homogenization head-on. Many citizens in Europe view the seemingly unbounded expansion of the European Union with anxiety, concerned that it will unleash standardizing forces that stamp out local practices and overrule traditional ways of life. When a French private company took over parts of the public transport system in Stockholm a few years ago, citizens in the Swedish capital were upset and nervous. Similarly, multinational utilities threaten to take the control of water and energy away from cities and regions. Yet not all the news is ominous. Perceptive observers of urban life can ask why Europe for a long time has been better than other parts of the world at tackling the problems that all large cities face. Despite the social conflicts that plague Parisian suburbs, Europe by and large seems to have

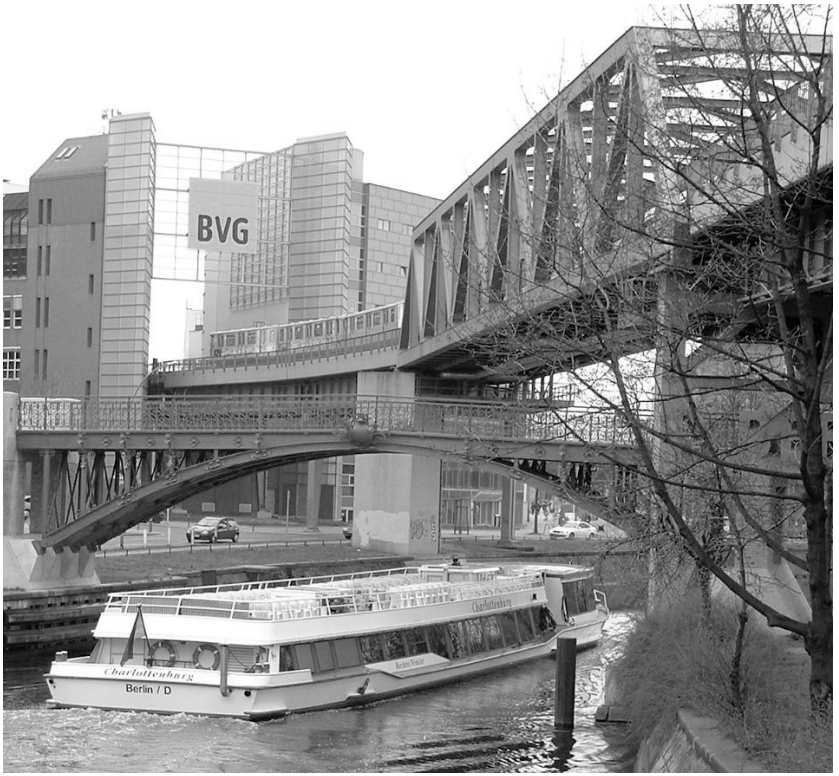

Figure 1.1
Diverse technical systems crammed into compact spaces typify modern cities. A Berlin tourist boat cruises up the Landwehr Canal through a mesh of automobile, pedestrian, rapid-transit, communication, and commercial networks—even a sprig of nature. Photographer: Thomas Misa.

avoided the appalling deterioration and unrestrained sprawl that one finds in too many American city centers and Third World megacities.

In this book we investigate the intersection of Europe, technology, and cities with an eye to these pressing concerns. Our focus is on the social forces, material structures, and cultural practices that created modern European cities in their great diversity. We hope our book gives readers insight into the prospects for Europe, the possibilities of cities, and the future potentials of technology. A history of European cities is filled with cases that might serve as positive models or warning examples for our time.

Cities, with their extreme agglomeration of people and unprecedented density of technology, have been at the core of modern history and modern society. It is no accident that the ''founding fathers'' of social theory took cities as their paradigm. ''This isolation of the individual—. . . everywhere the fundamental principle of modern

society[—]...has been pushed to its furthest limits in London,'' as Friedrich Engels (1845/1987, 31) put it. Émile Durkheim, Karl Marx, and Max Weber, in various ways, also situated the characteristically modern life in cities. In his essay of 1903, ''The Metropolis and Mental Life,'' Georg Simmel memorably described a new type of human being capable of withstanding the disorienting sensory overload of the modern city. The fast-paced rhythms of life in London, Budapest, Berlin, Vienna, St. Petersburg, and Prague inspired two generations of modernists, and worried many traditionalists (Jazbinsek 2003; Misa, this volume). With good reason, such writers and artists as Charles Dickens, Lewis Mumford, and Fritz Lang drew attention to the inhumane conditions in the city. In an age of unbridled industrialism and rampant urbanization, cities were the cutting edge of a new modern world, the place where people first experienced an environment that was meant to turn them into rational, disciplined, and alienated individuals—in factories, hospitals, offices, department stores, and huge residential areas. Streets that once were filled with the sounds of children playing were turned into traffic arteries, and pedestrians were literally forced onto the newly created ''sidewalk'' (Buiter, this volume). Cities were also where diverse masses of people congregated for employment and enjoyment. Throughout the twentieth century, Europe's cities were sites and symbols of an often painful history: the arc from the Fascist march on Rome to the internationalist treaty of Rome marks one central strand, while the Berlin airlift and the fall of the Berlin Wall are bookends for the Cold War. Today, the treaties of Rome, Maastricht, and Bologna are recognized signposts for European integration, whereas Brussels and Strasbourg are contested symbols of a new power apparatus.

Jürgen Osterhammel's observation in our epigraph about a homogenized Europe rings true, perhaps even more so for cities than for ''national societies'' as a whole. Skyscrapers, subways, parking garages, department stores, and suburbs everywhere look more or less the same, while once-pronounced national and regional differences in lifestyles, clothing, and food can be difficult to discern. Walk past the buzzing electronics shops, fast-food storefronts, and glass-enclosed office buildings in the centers of Rotterdam, Paris, or Turin, and it will be difficult to tell just where you are. Globalization reinforces these homogenizing forces. Wiring cities for the global economy, with the requisite business parks, tourist hotels, airport facilities, transport systems, and communications networks, obviously lays down a common material and institutional network. The ''global city'' is the epitome of these developments (Sassen 1991).

We hardly recognize that the technical infrastructures underpinning these integrating and homogenizing processes are many decades old, in some cases more than a century. Long before the political agreements that founded the European Economic Community (EEC) in 1957, Europe's cities were tied together by border-spanning rivers, railways, and motorways, as well as broadcasting and communications networks. The resulting flows of people, ideas, networks, and consumer goods created a

''hidden integration'' that prepared the groundwork for formal political integration and whose consequences are still felt today. And if its purely political foundations are no longer secure, the future of Europe may rest on the dynamics of these technological networks, spanning this continent and connecting it to the rest of the world (Misa and Schot 2005).

Cities have long been critical sites for exercising citizenship and configuring state power (Ribhegge 2003; Blockmans 2003). ''Stadtluft macht frei'' (city air makes one free) proclaimed the city gates of the Hanseatic League of trading cities. Our volume documents the emergence of material, institutional, professional, and political networks, and transnational governance strategies that evolved from the 1850s onward between European cities and across European nation-states. For instance, cities along the Rhine formed international commissions to manage the river for the competing goals of clean water, effective transport, and cheap waste disposal (Disco, this volume). Similarly, continent-wide standards and practices in urban planning, tourism, consumption, and even sustainable development led to informal networks and formal institutions that underpinned and shaped European integration in recent decades.

A crucial question remains whether we have ''room for maneuver'' in the face of these homogenizing and universalizing pressures. Will these pervasive networks simply make life everywhere the same, or can we facilitate diversity by creatively designing them—or even perhaps by subversively using them? Again, there are crucial lessons to be learned from European cities. Homogenization, in its many forms, has always been contested, and not only in such dramatic protests that regularly accompany the high-profile summits of economic globalizers. In Europe there are many instances when actors—city officials, engineers, planners, even ordinary citizens—have managed to make universalizing forces more appropriate to their domestic traditions and customs (Hommels 2005b; Jajeśniak-Quast, this volume). What have been their successful strategies, and what can we learn from their failed attempts? After all, innumerable local and regional peculiarities have persisted across Europe. Venture beyond Frankfurt's banking district or Stockholm's pedestrian area, and you can easily tell whether you are in Germany or Sweden. Exit the Amsterdam metro, cross over a seventeenth-century canal lovingly reconstructed with steel girders and modern cranes, and see that you of course are not in Greece. Avoid the hamburger bar or pizzeria and instead look for a local café in any smaller European town, and marvel at the menu of regional specialties. Clearly, many cities have understood the potentials of historical and cultural specificities and aggressively market these to an international audience: Kraków, Granada, and Venice come to mind. Perhaps modern society leaves us more opportunities than a menu of doom-and-gloom homogenization and globalization suggests, but if they are to survive, we must actively seek them out. We suggest that a portfolio of European cities, diverse as they are, is the perfect place to start looking.

Figure 1.2
A struggle with water and space has defined Amsterdam from the seventeenth century through today. Canals were even filled in to create space for housing and transport—until their tourist potential proved irresistible. Photographer: Thomas Misa.

The Making of the European City

We take as a point of departure Osterhammel's observation that the nations of Europe are more similar today than they have ever been. Instead of writing an *histoire totale* of European urban modernization, we frame our history with the problem of similarity and difference. Our book examines European cities to consider the menace of creeping homogeneity as well as creative responses and critical reactions. While the international circulation of experts, ideas, systems, and artifacts generated homogeneity on several levels, as we will show, European cities have retained, or at least reconstructed, much of their historically specific character. Our volume asks what this experience can teach us (cf. Bruijn and Norberg-Bohm 2005). It does so by highlighting such fields as urban energy systems, architecture, city planning, traffic engineering, water management, tourism, and consumption. We show that although urban technologies have certainly changed the face of European cities, individual citizens and officials and planners have modified and sometimes even rejected such changes. After World War II in

particular, European citizens faced the challenge of reconstructing the old structures or turning their cities into authentic modernist utopias.

Modern urban life is created by and depends on technological systems, urban planning, and an array of artifacts, buildings, networks, and structures. Throughout history, cities everywhere have been massive consumers of energy, producers of wealth, sites of worrisome mortality, and generators of noxious pollution. They have always depended on transport and communication networks to maintain economic dominance and political control over their hinterlands. Europe's cities have many distinct and layered histories. They grew or contracted in the ancient, medieval, Renaissance, baroque, and modern eras, but in each phase the interaction of social and cultural processes with human-made materiality defined how and where people lived, worked, moved about, recreated, and participated in civic culture. In turn, the human-made materialities we understand today as ''technology'' have largely been urban creations designed with the needs of the urban population and urban commerce in mind. This has been true from yesterday's pioneering gasworks, arcades, department stores, and streetcar lines to today's efforts to create environmentally sustainable residential areas. Throughout the modern period, city officials have invested tremendous effort in keeping chaos at bay and making European cities livable. Weaving together these three strands—Europe, technology, and cities—is our volume's task.

European cities provide us with windows on the role of technology in the making of Europe. Compared to cities on other continents, European cities have been better at keeping their distinct character. No perceptive observer would confuse the characteristically European panorama one sees out the airplane window on approaching Barcelona or Budapest or Berlin with that of Boston, often described as the most European-looking city in the United States. Madrid's suburban sprawl looks nothing like Chicago's. You can trace this distinctiveness on several levels—in the debates on Europe, the historical literature on Europe and its cities, and the ongoing efforts to define the boundaries of Europe.

Today's political and cultural debate about ''Europe'' is filled with rival conceptions about what it means to be European, what characteristics are common to European countries, and what institutions are best suited to keep Europe together or keep it from falling apart. These conceptions are all loaded with the burden of history. Promoters of an integrated Europe invent or reinvent historical traditions to create a common European identity, while critics point out that surprisingly few historical elements really bind this continent together (Shore 2000). Given the stakes, it is particularly crucial to investigate the historical narratives utilized by actors in the past and present, and as they may be used in the future (Eckstein and Throgmorton 2003).

The literature on ''Europe'' as a historical construct has exploded in recent years, while urban historians have scrutinized the concept of a ''European city'' (Schmale 2000; Hassenpflug 2000). Even though technology is typically viewed as a modernizing

and integrating force, efforts to understand its role in the project of European integration have just begun (Faulhaber and Tamburini 1991; Zysman and Schwartz 1998; Horrocks et al. 2000). Intriguingly, political scientists and geographers have recently ''discovered'' cities as a strategic, subnational space for research and analysis. Neil Brenner (2004) and Hubert Heinelt and Daniel Kübler (2005) argue that contemporary European cities are crucial sites where state power is being reconfigured and transformed. Our volume is the collective effort of historians wishing to contribute to this literature by presenting relevant material from the last century and a half. It tries to reveal the *inside of modern European cities*.

We take it as an axiom that the boundaries of ''Europe'' are continually in flux. The hot wars of the twentieth century ravaged the continent, while the ensuing Cold War brutally cut it in two. Political divisions of the Cold War into East and West can also be understood through segmented or divergent energy and transport networks, industrial production models, and consumption patterns (Strasser et al. 1998). More recently, the European Union expanded to embrace not only Portugal and Poland but also Slovenia and Slovakia, and it may someday stretch to include Turkey. Clearly there is no fixed political definition of Europe. For centuries Europe has also had clear links with its overseas colonies and with North America. The circulation of municipal engineers, urban planners, and city managers in fact spanned the whole globe. Colonial cities became laboratories of modernity in which engineers and planners often had much more freedom of action than back home (Arnold 2005), while the incomplete efforts to assimilate the colonies and colonial peoples into European society has left a volatile legacy in cities such as Marseille, London, and Rotterdam.

The recent attempts to bring Turkey closer to Europe, while appearing unprecedented, are in fact more than a century old. When Ottoman Empire officials and leading citizens initiated wide-ranging urban renewal and sanitary reforms in the late nineteenth century, they explicitly wanted to ''modernize'' Istanbul following the metropolises Berlin, London, and Paris. Germany and Britain offered technological models for fresh running water, while France suggested public health measures (Dinçkal, this volume). The Ottoman elites' promise that new technologies would bring about a ''modern'' way of life was repeated in many languages and many places. The compelling if ill-defined notion of modernity led many cities to install hygienic water systems during the second half of the nineteenth century, as well as to impose automobile-friendly traffic schemes after 1950 (see Lundin, this volume). While individual technological projects were often contested because of their high social and cultural costs, the overall project of modernity was seldom questioned (Rohkrämer 1999).

Cities are also windows on the making of the modern world. Modernists in literature and art gave cities personality and a voice. The Italian futurists reveled in ''the frenetic life of our great cities,'' painted kinetic images such as *The City Also Rises*, and wrote urban homages such as ''Il canto della città di Mannheim.'' As painter-theorist Piet

Mondrian phrased it, ''The genuinely Modern artist sees the metropolis as Abstract living converted into form; it is nearer to him than nature, and is more likely to stir in him the sense of beauty'' (Mondrian quoted in Banham 1960, 152). Poet Walt Merin even wrote staccato-sounding verses in the 1920s to represent the mechanical character of modern, urban life—an aspect of what we term, for short, *urban machinery*. And, not least, modernist planners and architects had their own pronounced impact on cities (Misa, this volume).

Cities were everywhere the primary object of the modernizers' dreams. Indeed, cities deployed select technologies to secure a ''modern'' reputation. Paris, already with a well-developed suburban rail and electrified tram network, built the underground Métropolitain railway as a showcase project for the 1900 world's fair. Known simply as the Métro, it was archetypically modern and characteristically French: fast and clean, rational and technically advanced, its entrances designed by leading art nouveau figures. Like the contemporaneous buildings designed by the Austrian architect Josef Hoffmann, the Métro was conceived as a ''piece of total art'' (*Gesamtkunstwerk*). Other European capitals, most famously Moscow, followed its lead. Interestingly, *Webster's* (1994) defines *metro* as ''a European subway.''

The coming of subways obviously restructured patterns of life and work, and this volume tries to understand the relation between a number of urban technologies and urban life. The city is a purpose-built environment where technologies to some extent shape human behavior and affect human well-being. Streets and bicycle lanes, residential areas and shopping malls, the barriers that mark off where you can and cannot walk—these urban artifacts are *dispositifs* that create what Michel Foucault (1977) called a ''spatial order.'' This order is also upheld by a number of institutions and organizations. We maintain that a proper understanding of cities requires acknowledging the profound interdependencies of technological systems with the multiple levels of urban life—*everyday-practical*, *institutional*, and *discursive*. Over the past century and a half, city dwellers were effectively habituated to use water closets, gas or electric stoves, streetcars and automobiles, highways and sidewalks. These technologies were once new, but they have now become so common and pervasive in everyday life that they mostly inhabit only the background of our consciousness. They are now ''second nature,'' an artificial structure that appears entirely natural. Daily life in cities completely depends on the technological systems that provide water and energy, remove sewage and trash, deliver information, and transport us between homes and workplaces. Unless they fail, we hardly notice them (Edwards 2003).

These technologies did not fall from the sky. Their funding and maintenance depended upon such institutions as local utility boards, city governments, regional energy providers, and, more recently, multinational corporations. Urban technological systems are creations of finance, regulation, and the prevailing political powers. In the nineteenth century, private companies erected energy, water, and even public trans-

Figure 1.3
The ''spatial order'' of cities simplified urban activities and disciplined urban residents. Here along the famous Andrássy boulevard in Budapest, there are defined spaces for shopping, walking, biking, and driving automobiles. Photographer: Thomas Misa.

port networks for profit, but fairly soon municipalities expanded their authority beyond overseeing and regulating private business. Under the banner of ''municipal socialism,'' city authorities founded public utilities to guarantee that services were provided equitably and reliably (Hård and Stippak, this volume). The institution of municipal ownership deserves a place alongside insurance and health care schemes as a fundamental building block of the twentieth-century European welfare state.

The third, discursive level needed to properly understand modern urban technologies becomes clear if we recall that few of them were anything more than hazy dreams in the mid-1800s and that none of them was available to the common person. Even the ''need'' for ample supplies of running water and correspondingly adequate sewage systems—taken for granted in European cities today—was by no means self-evident.

City officials, private entrepreneurs, and visionary promoters all mounted campaigns to persuade urban residents to adopt these technological luxuries as ''necessities.'' The introduction of urban technologies was always contested and accompanied by rhetorical work. Changes in discourse—the pervasive ''ways of thinking'' that structure what we know and in what terms we can know, involving language, argument, images, and symbols—are just as important as changes in institutions and daily practices.

Circulation and Appropriation

Circulation is a paradigm of modern urban life. In *Horse-Drawn Cabs and Omnibuses in Paris*, Nicholas Papayanis (1996) documents that the ''circulation'' of goods and people pervaded Paris as early as the eighteenth century. Within the city, there was the movement of vehicles and people, books and information, capital and labor, resources and waste. The modern nation-state took form when cities were interconnected and the urban flows became national flows (Vleuten and Kaijser 2005). Urban circulation and the exercise of state power were at issue in Paris in the wake of the 1848 street barricades, when Napoleon III sanctioned the plans of Georges Haussmann for reconstructing the old medieval city by forcibly building a matrix of boulevards through it. ''Napoleon and Haussmann envisioned the new roads as arteries in an urban circulatory system,'' in the words of Marshall Berman (1982, 150–151):

> The new construction wrecked hundreds of buildings, displaced uncounted thousands of people, destroyed whole neighborhoods that had lived for centuries. But it opened up the whole of the city, for the first time in its history, to all its inhabitants. Now, at last, it was possible to move not only within neighborhoods, but through them. Now, after centuries of life as a cluster of isolated cells, Paris was becoming a unified physical and human space.

In time, such grand boulevards with their homogenized and unified space would typify modern cities across the continent and around the world (see figures 3.4, 6.2, 7.3).

In many diverse fields, the interurban circulation of people, artifacts, and knowledge resulted in similar solutions appearing throughout Europe. British cities were models for water supply systems on the continent; a British company even built Berlin's first centralized water supply system. Spanish cities often chose French technologies. German models were especially strong in electrification and transportation. Europe's 220-volt electricity standard originated in Berlin and, in time, spread across the continent and eventually around much of the world (Schott and Buiter, this volume).

The successful spread of the Paris Métro and the Berlin 220-volt electricity standard illustrate how circulation brings about uniformity. Our chapters demonstrate how the concept of circulation can account for the manifest similarities across Europe in energy, transport, and road systems, urban planning concepts, traffic engineering, and a host of technical standards. *Circulation was an engine of homogenization*. Circulation was

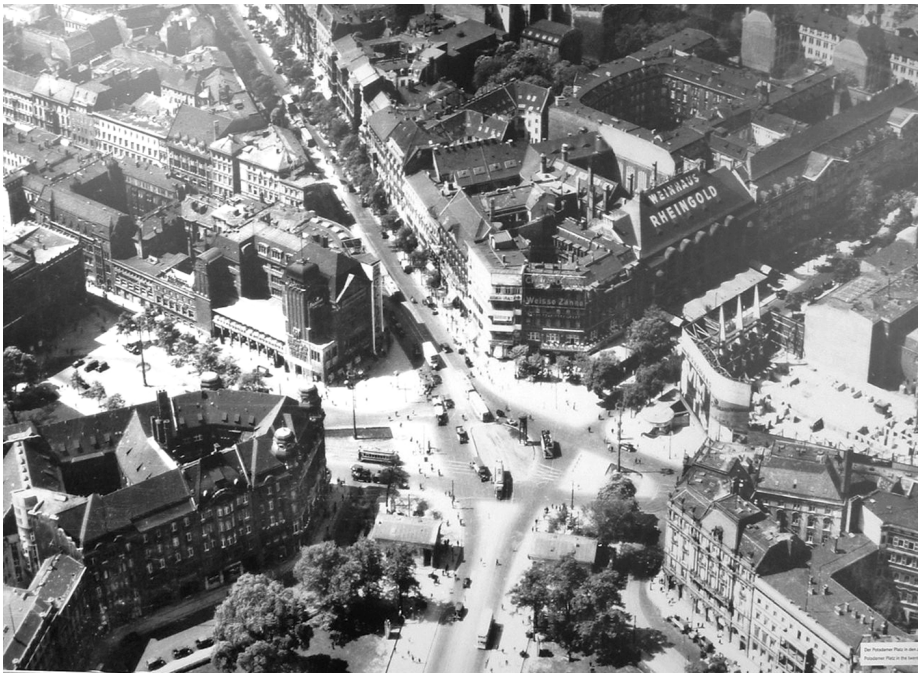

Figure 1.4
Modern boulevards ''opened up'' the medieval city to the circulation of people, goods, and ideas. Here the classic homogenized, open modern street in Berlin (with a view into Berlin's distinctive *Mietskasernen*, or ''tenement barracks''; see chapter 6). Photographer: Thomas Misa.

made possible by and through formal and informal study tours, international congresses and societies, and the emergence of professional journals in such fields as engineering, planning, public health, and architecture. It was not only progressive social reformers who constituted the ''Atlantic crossings'' documented by Daniel Rodgers (1998); countless engineers, architects, medical doctors, city planners, and civil servants traveled between North America and Europe looking for pioneering models, sympathetic colleagues, and evidence to influence developments back home. After World War II many European experts spent time in the United States on Fulbright grants, and after returning home they often actively ''Americanized'' Europe's roads, factories, and airports (Lundin, this volume). The Marshall Plan also contributed to this process (Kipping and Bjarnar 1998; Zeitlin and Herrigel 2000).

Circulation, then, understood as a dynamic constellation of institutions and forces, helps us to comprehend Osterhammel's observation that ''the national societies of Europe have never been more alike than today.'' There is, however, another side of the coin. When technologies are introduced into a new setting, they are often substantially

modified and even given new meanings. When water closets were introduced into cities on the European continent, they were considered to be British, a meaning they did not have in the United Kingdom; the English ''WC'' still persists in many languages. To function, technologies have to be domesticated into routines of daily life, incorporated into existing institutional arrangements, and assimilated into prevailing cognitive and linguistic structures (Hård and Jamison 2005). In short, actors must *appropriate* them.

Indeed, significant modifications in technologies and practices are the common outcome of local domestication processes. Apparently universal ''modernistic'' images, ideologies, and practices were in circulation during the first four decades of the twentieth century, but as Hård and Jamison (1998) show, countries in Europe appropriated them in distinct and culturally specific ways. Postwar reconstruction was molded by international funding and international models, which sometimes amounted to the same thing, but also by institutions and laws that differed from country to country. Just think about how differently the postwar cities in West Germany and East Germany were designed: car-friendliness dominated in the West, monumentality in the East. The contributors to this volume adopt the concept of appropriation as a conceptual tool for understanding the manifold *differences* that exist among European cities, as well as between them and other cities of the world.

The task of this volume is to investigate the place of modern technology in the making and reshaping of European cities. To do so, we emphasize the international *circulation* of technological knowledge, artifacts, services, and people. In parallel we highlight the *appropriation* processes that have modified the more or less globally available technologies. The two concepts enable us to understand the tension between homogenization and differentiation. Attention to circulation gives a historically meaningful account of technological convergence: namely, that technologies, to a great extent, appear to be ''the same'' everywhere you look—at least on the surface of things. And likewise, appropriation helps reformulate the social shaping of technology in historically grounded ways when looking inside individual cites. These concepts frame the stories that we tell.

Technological Systems and the Urban Matrix

A deeper exchange between technology studies and urban studies has been a long time in the making and yet still seems overdue (Hommels 2005a, 2005b).[1] Areas of overlapping concern include transport, water, waste, energy, communication, and other infrastructures and systems. Other compelling topics are urban planning and public health, architecture and housing, sites of production and consumption, and spaces of entertainment and sociability. The social histories of sanitation, urban medicine, and public health are also promising research sites (see, e.g., Luckin 1986; Reid 1991; Hamlin

1990, 1998). Richard Evans's model study *Death in Hamburg* (1987), for example, examined the relationship between public health and urban reform. Urban environmental history has positively boomed in recent years (Melosi 1993; Stine and Tarr 1998; Bernhardt 2001; Rose 2004), while historians of science have also developed an increasing interest in urban sites and spaces (cf. *Osiris*, vol. 18 [2003] on "Science and the City," and Heßler, this volume). In gender studies the city appears as a complex field, with diverse emancipatory and oppressive potentials (Wilson 1991; Green 1997; Bijker and Bijsterfeld 2000; Capuzzo, this volume). Even intellectual historians such as Andrew Lees (1985) anatomized the debates accompanying the spread of urban structures and urban lifestyles.

Figure 1.5
Sanitary and hygienic reformers at the turn of the century cleaned up city streets by deploying diverse technologies. One of Amsterdam's numerous outdoor street urinals, still keeping the canals clean. Photographer: Thomas Misa.

Recently urban historians have opened the "black box" of urban technologies. The movement began with special theme issues of the *Journal of Urban History* (in 1979, 1987, 2004) as well as selected articles in *Technology and Culture*.[2] Joseph Konvitz, Mark Rose, and Joel Tarr (1990) reviewed several different approaches to understanding technology and the city, emphasizing how public and private choices shaped urban and technological developments. Since the founding in 1989 of the European Association of Urban Historians and its biennial international conference, urban history—often foregrounding technological matters—has also flourished in Europe (Funck and Reif 2003). *Technology and the Rise of the Networked City in Europe and America*, edited by Tarr and Gabriel Dupuy (1988), focused on case studies of transport, water, waste, energy, and communication systems and how these systems shaped modern cities. As Julie Johnson-McGrath (1997) does in her admirable survey of the twofold "shape and shaping of urban technology," we conceptualize urban developments as complex, multifaceted processes that cannot be reduced to unidirectional impacts or constructions.

Many historians of technology have treated urban infrastructures, even though they have seldom problematized the city in its own right. Their interest in comprehending the evolving form of technological systems and networks led them naturally to focus on sites characterized by high concentrations of population, challenging spatial problems, and intellectual and financial stimuli for innovation—that is to say, cities. The histories of electricity, transit, water, sewage, roads, and building construction are to a large extent the histories of urban technologies. In his wide-ranging history of electrification, Thomas Hughes (1983) included detailed comparative analysis of Berlin, Chicago, and London. Some historians picked up Hughes's concept of "large technological system" and applied it to the development of city-based gasworks, electric power grids, and other energy networks (e.g., Schott 1997a), while others took up the idea that the diffusion of technological structures is dependent on local or regional particularities, leading to the unfolding of various "technological styles." Historians of technology have energetically debunked the "impact" that these systems supposedly had on cities, spotlighting instead the myriad social and cultural influences that affected the *urban machinery* in different settings. For example, instead of stressing the impact of telegraphs on cities, technology historian Paul Israel (1992) traced the influence of urban information markets on the telegraph industry.

Urban historians and historians of technology thus have a lot in common. The early works of Joel Tarr (1979) and Martin Melosi (1980, 1981) examined urban environmental problems that later found favor in the history of technology. Carl Condit's (1977, 1980–1981) comprehensive works on railroads and harbors in urban settings were warmly received. Tarr and Dupuy's edited volume, noted above, was unique in that it treated extensively both European and American developments. Tarr's award-winning *Search for the Ultimate Sink* (1996) reached a wide audience, and Melosi's *Sani-*

tary City (2000) was even awarded a prize by the Society for the History of Technology (SHOT). Another sign of intellectual convergence was the Open University Press's four edited volumes on the history of ''Cities & Technology'' in Europe and the United States (Goodman 1999; Goodman and Chant 1999; Roberts 1999; Roberts and Steadman 1999).

This volume follows in the traditions sketched out above, with an emphasis on exploring the cultural or linguistic ''turn'' in both urban and technological history (Gilfoyle 1998; Ladd 1997; Norton 2007). We write contextually rich histories that combine the technical with the social, the economic with the cultural, and the discursive with the spatial. We show how social, political, economic and cultural factors shape the dynamics of technological developments, and we try to find an adequate conceptual language for dealing with the technological shaping of cities. We demonstrate that modern European cities and their technological systems evolved in distinct ways. European cities were surprisingly open to ideas about urban modernization, and governments and citizens were often willing to adopt new technologies and transform them into public utilities. ''In what was effectively a pan-European discourse,'' as Driver and Gilbert (1999, 9) write, ''national models were implicitly and explicitly defined in relation to other national models, in a spirit of competition as much as emulation.'' The circulation of ideas through publications, conferences, exhibitions, personal visits, and multiple networks created ''a kind of European market in urban ideas, strategies and models.''

To understand the phenomena of uniformity and distinction, we adopt a perspective that highlights conflict and negotiation, power and control, inclusion and exclusion. From the very beginning the first urban gasworks and electric power plants were objects of and sometime subjects in political fights, economic deliberations, social differentiation, and cultural reinterpretations (Gugerli 1996). The contributors to this book foreground the interactions between humans and their surroundings and bring out the ''co-construction'' of technological structures and urban life. In doing so, we go ''inside'' the city and try to uncover its hidden technological structures and reveal its character as second nature. Instead of relying on older terms like ''impact'' and ''influence,'' which have many troubling mechanical associations and do not truly capture the fluidity of history, we focus on processes of circulation and appropriation.

Our book has been inspired by cultural studies and cultural history. Accordingly, we treat seriously such topics as meaning and discourse, representation and perception. Machines and structures such as shopping arcades, department stores, high-rises, streetcars, and street lights do more than move people around and keep shoppers out of the rain or dark; they also embody values, carry meanings, and transport norms (Reid 1991; Nye 1997; Brooks 1997). Even such unlikely structures as water and sewage systems were icons of modernity a century ago. It is important, however, not to forget that the symbolic meanings of institutions and buildings are never stable. At first,

contemporary critics denounced the Eiffel Tower (1889) as ugly, useless, monstrous, a latter-day Tower of Babel, a ''disgraceful skeleton,'' a ''gigantic factory chimney,'' ''the disgrace of Paris.'' Only in the early twentieth century did modernists fully embrace it as a positive symbol of modernity and French grandeur (Thompson 2000). Similarly, for decades political controversy dogged the sewer system installed in Berlin in the second half of the nineteenth century. While some observers regarded it as progressive and environmentally sound, others criticized it for being expensive and unhealthy. *Urban technologies are often highly contested*.

We also stress the social side of urban technology. The Haussmann clearances of central Paris pleased the officials charged with keeping order and the middle classes who could enjoy the newly opened urban circulation patterns, whereas they had dramatically negative consequences for poor tenants and small shopkeepers. The transition to mass commercialism that is characteristic of modern European cities began more than a century ago (Capuzzo, this volume). And while reformers focusing on sanitation and public housing might have had benevolent intentions, the reforms they instituted often increased the gap between the haves and have-nots. Urban sociotechnical structures frequently contribute to the separation, even segregation, of social groups and to the control and streamlining of behavior (Ben-Joseph 2005). *Urban engineering is always social engineering*.

Topics and Themes

Our chapters show that modern European cities took form amid an international flow of people and ideas. In his chapter, Hans Buiter maps the international character of urban engineering, paying close attention to how foreign knowledge about water, sewage, traffic, and street design was appropriated in the Netherlands and transformed into local practices. Dutch engineers traveled to Germany, Hungary, and Britain to identify technological solutions that would fit local Dutch conditions—not to find the ''one best way'' of making streets. Dutch streets embodied this selectively international background. Similarly, Mikael Hård and Marcus Stippak show how American reformers during the Progressive Era looked for inspiration to German and British cities. Urban engineers, reformers, and city officials kept current with transatlantic developments by scrutinizing an international literature, attending conferences, taking study trips, and inviting colleagues from abroad to make reciprocal visits. Multicentered flows of people and ideas also are prominent in Thomas Misa's chapter on modernism in Europe. He maintains that modernism in architecture and planning took form in a specifically European context. The version of modernism that focused on workers' housing, rational site development, and functionalist urban planning in the 1920s and 1930s responded directly to the severe problems of European cities, but did not resonate in the United States. After his proposals repeatedly fell on deaf ears during a much-

anticipated 1935 visit to the United States, Le Corbusier despairingly labeled America ''the land of the timid.''

Modernism's faith in technological solutions contributed to uniformity across the European continent and beyond. Especially after the Second World War, modernist planners and architects stamped a certain look on residential quarters, shopping districts, and office buildings nearly everywhere. The champions of this ideology, once claiming the label of a universalistic International Style, too often generated oppressively homogeneous results. As with many machines that allegedly ''change the world,'' however, modernism claimed a victory it only partially deserved. Misa traces the fate of modernist concepts in the Netherlands and Czechoslovakia, where rival schools lent modernism distinct inflections.

Homogeneity thus seems to be contingent and precarious, especially in Europe where there are strong local traditions and resilient local institutions. Schemes of top-down control are frequently partial and piecemeal. Le Corbusier's comprehensive plans for reconstructing the capital cities of Paris and Moscow went nowhere—while his planning ideals were most fully embodied in Chandigarh, Brasília, and public housing complexes in the United States and United Kingdom. Dagmara Jajeśniak-Quast shows that the Soviet model of Magnitogorsk—itself derived from Gary, Indiana—simply could not serve as a practical blueprint. Steel cities in East Germany, Poland, and Czechoslovakia took form, a bit like Buiter's streets and Misa's modernism, in an interplay of international circulation and local appropriation. Pál Germuska also analyzes the uneven character of top-down city planning in eleven Hungarian cities. Local geography and even local political traditions significantly modified the Soviet-inspired models. Despite the extreme centralizing forces, Germuska also discerns a multilayered appropriation process.

Opposition to large schemes was particularly vocal in the decades after 1968. For politicians and urban experts the change came rather suddenly. For a generation, they had reconfigured many European cities in the name of progress, modernity, and mobility, but now such efforts faced serious criticism. In Stockholm, postwar urban planners reshaped part of the city explicitly to fit the demands of the automobile. As Per Lundin shows in his chapter, their role model was the American city with its ring roads, oversize parking garages, and automobile-dependent suburbs, all of which promoted American values and an American way of life. After having embraced the American-style car-friendly city in the 1950s, many Europeans began to realize that the automobile threatened the European urban fabric. As the old saying goes, ''They got what they wanted, but lost what they had.''

Active and effective criticism of misguided urban planning schemes and architectural adventures followed Europe's encounter with the modernist city. While too many New Yorkers passively accepted the infamous Cross Bronx Expressway, literally paving the way for devastating urban blight, residents of Utrecht successfully mobilized against a

similar scheme to create a car-friendly city that would have paved over their city's canals. As Anique Hommels (2005b) makes clear, the Dutch urban system tenaciously resists changes imposed from outside. When the citizens of Munich recently banned the erection of skyscrapers, they did so in a conscious effort to preserve the historically defined character of their city. Meanwhile, citizens in Malmö, Sweden, adopted a much more ambivalent attitude to modernist Santiago Calatrava's design for a skyscraper. In his chapter, Andrew Jamison brings out the tensions in this project. Skyscrapers are signature icons of modernist architecture, and Calatrava's building is, of course, meant to show that Malmö has transcended its industrial past and become a thoroughly modern city. In fact, the project was originally to be an environmental exemplar, but Jamison argues that a sustainable skyscraper is a sad contradiction in terms.

Urban technologies often constitute a rich iconography. Calatrava's skyscraper in some way stands for Malmö, and in Garching, north of Munich, the town's central symbol is an atomic research reactor. Martina Heßler tells the story of this ''atomic egg'' and shows how it became emblematic for this village-turned-research-center. Her chapter highlights the synergies between research politics and urban planning ideals. When local politicians in the 1950s were asked to turn farmland and meadows into a high-tech R&D area, they readily accepted, and only a decade later the egg-shaped reactor had become an element in the official town crest. Ironically, however, the research center itself was hardly integrated in the rest of the village, and the knowledge workers remained strangers. The modernist planning principle of functional separation was just as inappropriate in Garching as elsewhere on the globe. Once the research center was built, it also proved hard to change Garching. When the modernist model of separated urban functions had lost its dominance in the 1980s and Silicon Valley had become a model for politicians and planners of science the world over, local politicians instead tried to turn Garching into a Bavarian version of Palo Alto.

Garching's policy has to be seen as an attempt to attract scarce resources in a knowledge economy. Due to Europe's distinctive geographic density, competition between cities has had a long history. No other continent has so many sizable cities, each with substantial legal independence, crammed into such a compact space. Malmö politicians launched their modernizing campaign expressly to compete with Copenhagen, situated just across the Öresund strait. Competition between cities along the river Rhine also has a long history. In his chapter, Cornelis Disco discusses how French, German, and Swiss cities in the river basin have competed (and sometimes cooperated) over the centuries. He shows that the Rhine as a modern artery of transport connecting Switzerland with the North Sea is a creation of humans and not a fact of nature. Owing to heavy investments in various hydraulic engineering projects, the circulation of goods and people increased between such cities as Mannheim, Strasbourg, and Basel, but so did competition between them. Disco shows that the creation of the Rhine as

an integrated international space was hardly a smooth process; there were many political and jurisdictional battles (not to mention several wars). Yet, again, Europeans developed intercity and international institutions to manage these conflicts.

The emergence of the Rhine as a continental artery for goods went hand in hand with its discovery as a prime area for tourism. The first steamships brought tourists to the famous Loreley cliff in the 1820s. As Paolo Capuzzo shows, travelers began to turn certain parts of Europe into touristic sites. For northern Europeans Rome was already an established goal, but soon select other cities joined the required itinerary for a Grand Tour. Tourism also created such entirely new cities as Brighton on the English coast as well as Cannes and Nice on the Mediterranean. Applying Guy Debord's intriguing notion of ''spectacle,'' Capuzzo shows how these seaside resorts became places of consumption in their own right. The construction of railroad—and later, automobile and airplane—connections was necessary. In order to attract visitors, the municipal authorities consciously built modern urban infrastructures while marketing their city as a place for relaxation.

Marketing may serve as an inroad to the ways in which urban technologies have been given meaning, and how such meanings have enabled actors to create what Pierre Bourdieu (1984) once called ''distinction.'' Mary Blume's book on the Côte d'Azur, subtitled *Inventing the French Riviera* (1992), shows the emergence of tourist cities as an inventive act that involves the design of technological structures as well as the cognitive definition or redefinition of towns and places. This cultural perspective can be found in all our chapters; tourism is hardly unique. For instance, Dieter Schott emphasizes how the emerging electricity industry used the 1891 Frankfurt International Electricity Exhibition to bring its products to the attention of city officials and urban residents. Here we also find elements of ''spectacle'': electrification during the early decades focused on up-market shops, restaurants, and theaters in the fashionable districts.

In their search for relaxation, Europe's holiday makers fled the urban machinery they might have found restrictive or even overwhelming at home. Increasingly, however, they found themselves in tourist areas that were as thoroughly modernized and mechanized as the cities they sought to escape. With time, the wish to escape turned into a desire to relax while having standards of living like those back home. In this way the pervasive circulation of people around Europe—tourists, engineers, city officials, planners, and experts—contributed to the establishment of homogeneity and common standards across the continent.

We can now understand why ''the national societies of Europe have never been more alike than today.'' The creation of urban homogeneity in Europe is an outcome of wishes and visions on the part of the population at large as well as the result of the hegemonic ambitions of modernism. We hope that our book will help citizens, policymakers, and professionals gain insight into how Europe for the most part avoided the

"universal urban homogenization" believed by some to be the inescapable destiny of cities worldwide (e.g., Goodman and Chant 1999, 353). In the twenty-first century we will need to reinvent institutions and mechanisms in order to keep our cities livable.

Notes

1. Citations to the sizable literature in urban studies and technology studies can be found in Hård (2001) and Hård and Misa (2003).

2. The special theme issues of the *Journal of Urban History* included "The City and Technology" 5 (May 1979); "The City and Technology" 14 (November 1987); "Technology, Politics, and the Structuring of the City" 30 (July 2004).