The Rise of the Network Society

Second edition
With a new preface

Manuel Castells

WILEY-BLACKWELL
A John Wiley & Sons, Ltd., Publication

This second edition with a new preface first published 2010

Edition history: Blackwell Publishing Ltd (1e, 1996), Blackwell Publishing Ltd (2e, 2000)

Blackwell Publishing was acquired by John Wiley & Sons in February 2007. Blackwell's publishing program has been merged with Wiley's global Scientific, Technical, and Medical business to form Wiley-Blackwell.

Registered Office
John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, United Kingdom

Editorial Offices
350 Main Street, Malden, MA 02148-5020, USA
9600 Garsington Road, Oxford, OX4 2DQ, UK
The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK

For details of our global editorial offices, for customer services, and for information about how to apply for permission to reuse the copyright material in this book please see our website at www.wiley.com/wiley-blackwell.

Library of Congress Cataloging-in-Publication Data

Castells, Manuel, 1942–
The rise of the network society / Manuel Castells. – 2nd ed., with a new pref.
p. cm. – (Information age ; v. 1)
Includes bibliographical references and index.
ISBN 978-1-4051-9686-4 (pbk. : alk. paper) 1. Information technology–Economic aspects. 2. Information society. 3. Information networks. 4. Technology and civilization. I. Title.
HC79.I55C373 2010
303.48'33–dc22

2009009312

A catalogue record for this book is available from the British Library.

Set in 10.5/12 Sabon by SPi Publisher Services Ltd, Pondicherry, India
Printed in Singapore by Markono Print Media Pte Ltd

01 2010

Contents

Prologue: the Net and the Self

"Do you think me a learned, well-read man?"
"Certainly," replied Zi-gong. "Aren't you?"
"Not at all," said Confucius. "I have simply grasped one thread which links up the rest."

Sima Qian, "Confucius"[1]

Toward the end of the second millennium of the Christian era several events of historical significance transformed the social landscape of human life. A technological revolution, centered around information technologies, began to reshape, at accelerated pace, the material basis of society. Economies throughout the world have become globally interdependent, introducing a new form of relationship between economy, state, and society, in a system of variable geometry. The collapse of Soviet statism, and the subsequent demise of the international communist movement, has undermined for the time being the historical challenge to capitalism, rescued the political left (and Marxian theory) from the fatal attraction of Marxism–Leninism, brought the Cold War to an end, reduced the risk of nuclear holocaust, and fundamentally altered global geopolitics. Capitalism itself has undergone a process of profound restructuring, characterized by greater flexibility in management; decentralization and networking of firms both internally and in their relationships to other firms; considerable empowering of capital *vis-à-vis* labor, with the concomitant decline in influence of the labor movement; increasing individualization and diversification of

1 Recounted in Sima Qian (145–*c.*89BC), "Confucius," in Hu Shi, *The Development of Logical Methods in Ancient China* (Shanghai: Oriental Book Company, 1922), quoted in Qian (1985: 125).

working relationships; massive incorporation of women into the paid labor force, usually under discriminatory conditions; intervention of the state to deregulate markets selectively, and to undo the welfare state, with different intensity and orientations depending upon the nature of political forces and institutions in each society; stepped-up global economic competition, in a context of increasing geographic and cultural differentiation of settings for capital accumulation and management. As a consequence of this general overhauling of the capitalist system, still under way, we have witnessed the global integration of financial markets, the rise of the Asian Pacific as the new dominant, global manufacturing center, the arduous economic unification of Europe, the emergence of a North American regional economy, the diversification, then disintegration, of the former Third World, the gradual transformation of Russia and the ex-Soviet area of influence in market economies, the incorporation of valuable segments of economies throughout the world into an interdependent system working as a unit in real time. Because of these trends, there has also been an accentuation of uneven development, this time not only between North and South, but between the dynamic segments and territories of societies everywhere, and those others that risk becoming irrelevant from the perspective of the system's logic. Indeed, we observe the parallel unleashing of formidable productive forces of the informational revolution, and the consolidation of black holes of human misery in the global economy, be it in Burkina Faso, South Bronx, Kamagasaki, Chiapas, or La Courneuve.

Simultaneously, criminal activities and Mafia-like organizations around the world have also become global and informational, providing the means for stimulation of mental hyperactivity and forbidden desire, along with all forms of illicit trade demanded by our societies, from sophisticated weaponry to human flesh. In addition, a new communication system, increasingly speaking a universal, digital language, is both integrating globally the production and distribution of words, sounds and images of our culture, and customizing them to the tastes of the identities and moods of individuals. Interactive computer networks are growing exponentially, creating new forms and channels of communication, shaping life and being shaped by life at the same time.

Social changes are as dramatic as the technological and economic processes of transformation. For all the difficulty in the process of transformation of women's condition, patriarchalism has come under attack, and has been shaken in a number of societies. Thus, gender relationships have become, in much of the world, a contested domain, rather than a sphere of cultural reproduction. A fundamental redefinition of relationships between women, men and children has followed,

and thus, of family, sexuality, and personality. Environmental consciousness has permeated down to the institutions of society, and its values have won political appeal, at the price of being belied and manipulated in the daily practice of corporations and bureaucracies. Political systems are engulfed in a structural crisis of legitimacy, periodically wrecked by scandals, essentially dependent on media coverage and personalized leadership, and increasingly isolated from the citizenry. Social movements tend to be fragmented, localistic, single-issue oriented, and ephemeral, either retrenched in their inner worlds, or flaring up for just an instant around a media symbol. In such a world of uncontrolled, confusing change, people tend to regroup around primary identities: religious, ethnic, territorial, national. Religious fundamentalism – Christian, Islamic, Jewish, Hindu, and even Buddhist (in what seems to be a contradiction in terms) – is probably the most formidable force for personal security and collective mobilization in these troubled times. In a world of global flows of wealth, power, and images, the search for identity, collective or individual, ascribed or constructed, becomes the fundamental source of social meaning. This is not a new trend, since identity, and particularly religious and ethnic identity, has been at the roots of meaning since the dawn of human society. Yet identity is becoming the main, and sometimes the only, source of meaning in an historical period characterized by widespread destructuring of organizations, delegitimation of institutions, fading away of major social movements, and ephemeral cultural expressions. People increasingly organize their meaning not around what they do but on the basis of what they are, or believe they are. Meanwhile, on the other hand, global networks of instrumental exchanges selectively switch on and off individuals, groups, regions, and even countries, according to their relevance in fulfilling the goals processed in the network, in a relentless flow of strategic decisions. There follows a fundamental split between abstract, universal instrumentalism, and historically rooted, particularistic identities. *Our societies are increasingly structured around a bipolar opposition between the Net and the self.*

In this condition of structural schizophrenia between function and meaning, patterns of social communication become increasingly under stress. And when communication breaks down, when it does not exist any longer, even in the form of conflictual communication (as would be the case in social struggles or political opposition), social groups and individuals become alienated from each other, and see the other as a stranger, eventually as a threat. In this process, social fragmentation spreads, as identities become more specific and increasingly difficult to share. The informational society, in its global manifestation, is also the world of *Aum Shinrikyo*, of the American militia, of

Islamic/Christian theocratic ambitions, and of Hutu/Tutsi reciprocal genocide.

Bewildered by the scale and scope of historical change, culture and thinking in our time often embrace a new millenarianism. Prophets of technology preach the new age, extrapolating to social trends and organization the barely understood logic of computers and DNA. Postmodern culture, and theory, indulge in celebrating the end of history, and, to some extent, the end of reason, giving up on our capacity to understand and make sense, even of nonsense. The implicit assumption is the acceptance of full individualization of behavior, and of society's powerlessness over its destiny.

The project informing this book swims against streams of destruction, and takes exception to various forms of intellectual nihilism, social skepticism, and political cynicism. I believe in rationality, and in the possibility of calling upon reason, without worshipping its goddess. I believe in the chances of meaningful social action, and transformative politics, without necessarily drifting toward the deadly rapids of absolute utopias. I believe in the liberating power of identity, without accepting the necessity of either its individualization or its capture by fundamentalism. And I propose the hypothesis that all major trends of change constituting our new, confusing world are related, and that we can make sense of their interrelationship. And, yes, I believe, in spite of a long tradition of sometimes tragic intellectual errors, that observing, analyzing, and theorizing are a way of helping to build a different, better world. Not by providing the answers – that will be specific to each society and found by social actors themselves – but by raising some relevant questions. This book would like to be a modest contribution to a necessarily collective, analytical effort, already underway from many horizons, aimed at understanding our new world on the basis of available evidence and exploratory theory.

To take some first steps in this direction: we must treat technology seriously, using it as the point of departure of this inquiry; we need to locate the process of revolutionary technological change in the social context in which it takes place and by which it is being shaped; and we should keep in mind that the search for identity is as powerful as techno-economic change in charting the new history. So, having said this, we will depart on our intellectual journey, following an itinerary that will take us to numerous domains, and across several cultures and institutional contexts, since the understanding of a global transformation requires a perspective as global as possible, within the obvious limits of this author's experience and knowledge.

Technology, Society, and Historical Change

The information technology revolution, because of its pervasiveness throughout the whole realm of human activity, will be my entry point in analyzing the complexity of the new economy, society, and culture in the making. This methodological choice does not imply that new social forms and processes emerge as a consequence of technological change. Of course, technology does not determine society.[2] Nor does society script the course of technological change, since many factors, including individual inventiveness and entrepreneurialism, intervene in the process of scientific discovery, technological innovation, and social applications, so that the final outcome depends on a complex pattern of interaction.[3] Indeed, the dilemma of technological determinism is probably a false problem,[4] since technology *is* society, and society cannot be understood or represented without its technological tools.[5] Thus, when in the 1970s a new technological paradigm, organized around information technology, came to be constituted, mainly in the United States (see chapter 1), it was a specific segment of American society, in interaction with the global economy and with world geopolitics, that materialized into a new way of producing, communicating, managing, and living. That the constitution of this paradigm took place in the United States, and to some extent in California, and in the 1970s, probably had considerable consequences for the forms and evolution of new information technologies. For instance, in spite of the decisive role of military funding and markets in fostering early stages of the electronics industry during the 1940s–1960s, the technological blossoming that took place in the early 1970s can be somehow related to the culture of freedom, individual innovation, and entrepreneurialism that grew out of the 1960s' culture of American campuses. Not so much in terms of its politics, since Silicon Valley was, and is, a solid bastion of the conservative vote, and most innovators were meta-political, but with regard to social values of breaking away from established patterns of behavior, both in society at large and in the business world. The emphasis on personalized devices, on

2 See the interesting debate on the matter in Smith and Marx (1994).

3 Technology does not determine society: it embodies it. But nor does society determine technological innovation: it uses it. This dialectical interaction between society and technology is present in the works of the best historians, such as Fernand Braudel.

4 Classic historian of technology Melvin Kranzberg has forcefully argued against the false dilemma of technological determinism. See, for instance, Kranzberg's (1992) acceptance speech of the award of honorary membership in NASTS.

5 Bijker et al. (1987).

interactivity, on networking, and the relentless pursuit of new technological breakthroughs, even when it apparently did not make much business sense, was clearly in discontinuity with the somewhat cautious tradition of the corporate world. The information technology revolution half-consciously[6] diffused through the material culture of our societies the libertarian spirit that flourished in the 1960s' movements. Yet, as soon as new information technologies diffused, and were appropriated by different countries, various cultures, diverse organizations, and miscellaneous goals, they exploded in all kinds of applications and uses that fed back into technological innovation, accelerating the speed, broadening the scope of technological change, and diversifying its sources.[7] An illustration will help us to understand the importance of unintended social consequences of technology.[8]

As is known, the Internet originated in a daring scheme imagined in the 1960s by the technological warriors of the US Defense Department Advanced Research Projects Agency (the mythical DARPA) to prevent a Soviet takeover or destruction of American communications in the event of nuclear war. To some extent, it was the electronic equivalent of the Maoist tactics of dispersal of guerrilla forces around a vast territory to counter an enemy's might with versatility and knowledge of terrain. The outcome was a network architecture which, as its inventors wanted, cannot be controlled from any center, and is made up of thousands of autonomous computer networks that have innumerable ways to link up, going around electronic barriers. Ultimately ARPANET, the network set up by the US Defense Department, became the foundation of a global, horizontal communication network

6 There is still to be written a fascinating social history of the values and personal views of some of the key innovators of the 1970s' Silicon Valley revolution in computer technologies. But a few indications seem to point to the fact that they were intentionally trying to undo the centralizing technologies of the corporate world, both out of conviction and as their market niche. As evidence, I recall the famous Apple Computer 1984 advertising spot to launch Macintosh, in explicit opposition to Big Brother IBM of Orwellian mythology. As for the countercultural character of many of these innovators, I shall also refer to the life story of the genius developer of the personal computer, Steve Wozniak: after quitting Apple, bored by its transformation into another multinational corporation, he spent a fortune for a few years subsidizing rock groups that he liked, before creating another company to develop technologies of his taste. At one point, after having created the personal computer, Wozniak realized that he had no formal education in computer sciences, so he enrolled at UC Berkeley. But in order to avoid embarrassing publicity he used another name.

7 For selected evidence concerning the variation of information technology diffusion patterns in different social and institutional contexts, see, among other works: Bertazzoni et al. (1984); Guile (1985); Agence de l'Informatique (1986); Castells et al. (1986); Landau and Rosenberg (1986); Bianchi et al. (1988); Watanuki (1990); Freeman et al. (1991); Wang (1994).

8 For an informed and cautious discussion of relationships between society and technology, see Fischer (1985).

of thousands of computer networks (comprising over 300 million users in 2000, up from less than 20 million in 1996, and growing fast) that has been appropriated for all kinds of purposes, quite removed from the concerns of an extinct Cold War, by individuals and groups around the world. Indeed, it was via the Internet that Subcomandante Marcos, the leader of Chiapas' *Zapatistas*, communicated with the world, and with the media, from the depths of Lacandon forest. And the Internet played an instrumental role in the development of Falun Gong, the Chinese cult that challenged the Chinese Communist party in 1999, and in the organization and diffusion of the protest against the World Trade Organization in Seattle in December 1999.

Yet, if society does not determine technology, it can, mainly through the state, suffocate its development. Or alternatively, again mainly by state intervention, it can embark on an accelerated process of technological modernization able to change the fate of economies, military power, and social well-being in a few years. Indeed, the ability or inability of societies to master technology, and particularly technologies that are strategically decisive in each historical period, largely shapes their destiny, to the point where we could say that while technology *per se* does not determine historical evolution and social change, technology (or the lack of it) embodies the capacity of societies to transform themselves, as well as the uses to which societies, always in a conflictive process, decide to put their technological potential.[9]

Thus, around 1400, when the European Renaissance was planting the intellectual seeds of technological change that would dominate the world three centuries later, China was the most advanced technological civilization in the world, according to Mokyr.[10] Key inventions had developed in China centuries earlier, even a millennium and a half earlier, as in the case of blast furnaces that allowed the casting of iron in China by 200BC. Also, Su Sung introduced the water clock in AD 1086, surpassing the accuracy of measurement of European mechanical clocks of the same date. The iron plow was introduced in the sixth century, and adapted to wet-field rice cultivation two centuries later. In textiles, the spinning wheel appeared at the same time as in the West, by the thirteenth century, but advanced much faster in China because there was an old-established tradition of sophisticated weaving equipment: draw looms to weave silk were used in Han times. The adoption of water power was parallel to Europe: by the eighth century

9 See the analyses presented in Castells (1988b); also Webster (1991).

10 My discussion of China's interrupted technological development relies mainly on an extraordinary chapter by Joel Mokyr (1990: 209–38) and on a most insightful, although controversial, book, Qian (1985).

the Chinese were using hydraulic trip hammers, and in 1280 there was wide diffusion of the vertical water wheel. Ocean travel was easier for the Chinese at an earlier date than for European vessels: they invented the compass around AD 960, and their junks were the most advanced ships in the world by the end of the fourteenth century, enabling long sea trips. In military matters, the Chinese, besides inventing gun powder, developed a chemical industry that was able to provide powerful explosives, and the crossbow and the trebuchet were used by Chinese armies centuries ahead of Europe. In medicine, techniques such as acupuncture were yielding extraordinary results that only recently have been universally acknowledged. And, of course, the first information processing revolution was Chinese: paper and printing were Chinese inventions. Paper was introduced in China 1,000 years earlier than in the West, and printing probably began in the late seventh century. As Jones writes: "China came within a hair's breadth of industrializing in the fourteenth century."[11] That it did not, changed the history of the world. When in 1842 the Opium Wars led to Britain's colonial impositions, China realized, too late, that isolation could not protect the Middle Kingdom from the evil consequences of technological inferiority. It took more than one century thereafter for China to start recovering from such a catastrophic deviation from its historical trajectory.

Explanations for such a stunning historical course are both numerous and controversial. There is no place in this Prologue to enter the complexity of the debate. But, on the basis of research and analysis by historians such as Needham, Qian, Jones, and Mokyr,[12] it is possible to suggest an interpretation that may help to understand, in general terms, the interaction between society, history, and technology. Indeed, most hypotheses concerning cultural differences (even those without implicitly racist undertones) fail to explain, as Mokyr points out, the difference not between China and Europe but between China in 1300 and China in 1800. Why did a culture and a kingdom that had been the technological leader of the world for thousands of years suddenly become technologically stagnant precisely at the moment when Europe embarked on the age of discoveries, and then on the industrial revolution?

Needham has proposed that Chinese culture was more prone than Western values to a harmonious relationship between man and nature, something that could be jeopardized by fast technological innovation. Furthermore, he objects to the Western criteria used to measure technological development. However, this cultural emphasis on a

11 Jones (1981: 160), cited by Mokyr (1990: 219).
12 Needham (1954–88, 1969, 1981); Qian (1985); Jones (1988); Mokyr (1990).

holistic approach to development had not impeded technological innovation for millenniums, nor stopped ecological deterioration as a result of irrigation works in southern China, when the conservation of nature was subordinated to agricultural production in order to feed a growing population. In fact, Wen-yuan Qian, in his powerful book, takes exception to Needham's somewhat excessive enthusiasm for the feats of Chinese traditional technology, notwithstanding his shared admiration for Needham's monumental life-long work. Qian calls for a closer analytical linkage between the development of Chinese science and the characteristics of Chinese civilization dominated by the dynamics of state. Mokyr also considers the state to be the crucial factor in explaining Chinese technological retardation in modern times. The explanation may be proposed in three steps: technological innovation was, for centuries, fundamentally in the hands of the state; after 1400 the Chinese state, under the Ming and Qing dynasties, lost interest in technological innovation; and, partly because of their dedication to serve the state, cultural and social elites were focused on arts, humanities, and self-promotion *vis-à-vis* the imperial bureaucracy. Thus, what does seem to be crucial is the role of the state, and the changing orientation of state policy. Why would a state that had been the greatest hydraulic engineer in history, and had established an agricultural extension system to improve agricultural productivity since the Han period, suddenly become inhibited from technological innovation, even forbidding geographical exploration, and abandoning the construction of large ships by 1430? The obvious answer is that it was not the same state; not only because they were of different dynasties, but because the bureaucratic class became more deeply entrenched in the administration due to a longer than usual period of uncontested domination.

According to Mokyr, it appears that the determining factor for technological conservatism was the rulers' fears of the potentially disruptive impacts of technological change on social stability. Numerous forces opposed the diffusion of technology in China, as in other societies, particularly the urban guilds. Bureaucrats content with the status quo were concerned by the possibility of triggering social conflicts that could coalesce with other sources of latent opposition in a society that had been kept under control for several centuries. Even the two enlightened Manchu despots of the eighteenth century, K'ang Chi and Ch'ien Lung, focused their efforts on pacification and order, rather than on unleashing new development. Conversely, exploration and contacts with foreigners, beyond controlled trade and the acquisition of weapons, were deemed at best unnecessary, at worst threatening, because of the uncertainty they would imply. A bureaucratic state

without external incentive and with internal disincentives to engage in technological modernization opted for the most prudent neutrality, as a result stalling the technological trajectory that China had been following for centuries, if not millenniums, precisely under state guidance. A discussion of the factors underlying the dynamics of the Chinese state under the Ming and Qing dynasties is clearly beyond the scope of this book. What matters for our research purposes are two teachings from this fundamental experience of interrupted technological development: on the one hand, the state can be, and has been in history, in China and elsewhere, a leading force for technological innovation; on the other hand, precisely because of this, when the state reverses its interest in technological development, or becomes unable to perform it under new conditions, a statist model of innovation leads to stagnation, because of the sterilization of society's autonomous innovative energy to create and apply technology. That the Chinese state could, centuries later, build anew an advanced technological basis, in nuclear technology, missiles, satellite launching, and electronics,[13] demonstrates again the emptiness of a predominantly cultural interpretation of technological development and backwardness: the same culture may induce very different technological trajectories depending on the pattern of relationships between state and society. However, the exclusive dependence on the state has a price, and the price for China was that of retardation, famine, epidemics, colonial domination, and civil war, until at least the middle of the twentieth century.

A rather similar, contemporary story can be told, and will be told in this book (in volume III), of the inability of Soviet statism to master the information technology revolution, thus stalling its productive capacity and undermining its military might. Yet we should not jump to the ideological conclusion that all state intervention is counterproductive to technological development, indulging in ahistorical reverence for unfettered, individual entrepreneurialism. Japan is of course the counter-example, both to Chinese historical experience and to the inability of the Soviet state to adapt to the American-initiated revolution in information technology.

Historically, Japan went, even deeper than China, through a period of historical isolation under the Tokugawa Shogunate (established in 1603), between 1636 and 1853, precisely during the critical period of the formation of an industrial system in the Western hemisphere. Thus, while at the turn of the seventeenth century Japanese merchants were trading throughout East and South-East Asia, using modern vessels of up to 700 tons, the construction of ships above 50 tons was prohib-

13 Wang (1993).

ited in 1635, and all Japanese ports, except Nagasaki, were closed to foreigners, while trade was restricted to China, Korea, and Holland.[14] Technological isolation was not total during these two centuries, and endogenous innovation did allow Japan to proceed with incremental change at a faster pace than China.[15] Yet, because Japan's technological level was lower than China's, by the mid-nineteenth century the *kurobune* (black ships) of Commodore Perry could impose trade and diplomatic relations on a country substantially lagging behind Western technology. However, as soon as the 1868 *Ishin Meiji* (Meiji Restoration) created the political conditions for a decisive state-led modernization,[16] Japan progressed in advanced technology by leaps and bounds in a very short time span.[17] As just one significant illustration, because of its current strategic importance, let us briefly recall the extraordinary development of electrical engineering and communication applications in Japan in the last quarter of the nineteenth century.[18] Indeed, the first independent department of electrical engineering in the world was established in 1873 in the newly founded Imperial College of Engineering in Tokyo, under the leadership of its dean, Henry Dyer, a Scottish mechanical engineer. Between 1887 and 1892, a leading academic in electrical engineering, British professor William Ayrton, was invited to teach at the college, being instrumental in disseminating knowledge to the new generation of Japanese engineers, so that by the end of the century the Telegraph Bureau was able to replace foreigners in all its technical departments. Technology transfer from the West was sought through a variety of mechanisms. In 1873, the machine shop of the Telegraph Bureau sent a Japanese clockmaker, Tanaka Seisuke, to the International Machines exhibition in Vienna to obtain information on the machines. About ten years later, all the bureau's machines were made in Japan. Based on this technology, Tanaka Daikichi founded in 1882 an electrical factory, Shibaura Works, which, after its acquisition by Mitsui, went on to

14 Chida and Davies (1990).

15 Ito (1993).

16 Several distinguished Japanese scholars, and I tend to concur with them, consider that the best Western account of the Meiji Restoration, and of the social roots of Japanese modernization, is Norman (1940). It has been translated into Japanese and is widely read in Japanese universities. A brilliant historian, educated at Cambridge and Harvard, before joining the Canadian diplomatic corps, Norman was denounced as a communist by Karl Wittfogel to the McCarthy Senate Committee in the 1950s, and was then submitted to constant pressure from Western intelligence agencies. Appointed Canadian ambassador to Egypt, he committed suicide in Cairo in 1957. On the contribution of this truly exceptional scholar to the understanding of the Japanese state, see Dower (1975); for a different perspective, see Beasley (1990).

17 Kamatani (1988); Matsumoto and Sinclair (1994).

18 Uchida (1991).

become Toshiba. Engineers were sent to Europe and to America. And Western Electric was permitted to produce and sell in Japan in 1899, in a joint venture with Japanese industrialists: the name of the company was NEC. On such a technological basis Japan went full speed into the electrical and communications age before 1914: by 1914 total power production had reached 1,555,000 kw/hour, and 3,000 telephone offices were relaying a billion messages a year. It is indeed symbolic that Commodore Perry's gift to the Shogun in 1857 was a set of American telegraphs, until then never seen in Japan: the first telegraph line was laid in 1869, and ten years later Japan was connected to the whole world through a transcontinental information network, via Siberia, operated by the Great Northern Telegraph Co., jointly managed by Western and Japanese engineers and transmitting in both English and Japanese.

The story of how Japan became a major world player in information technology industries in the last quarter of the twentieth century, under the strategic guidance of the state, is now general public knowledge, so it will be assumed in our discussion.[19] What is relevant for the ideas presented here is that it happened at the same time as an industrial and scientific superpower, the Soviet Union, failed this fundamental technological transition. It is obvious, as the preceding reminders show, that Japanese technological development since the 1960s did not happen in an historical vacuum, but was rooted in a decades-old tradition of engineering excellence. Yet what matters for the purpose of this analysis is to emphasize what dramatically different results state intervention (and lack of intervention) had in the cases of China and the Soviet Union, as compared to Japan in both the Meiji period and the post-Second World War period. The characteristics of the Japanese state at the roots of both processes of modernization and development are well known, both for *Ishin Meiji*[20] and for the contemporary developmental state,[21] and their presentation would take us excessively away from the focus of these preliminary reflections. What must be retained for the understanding of the relationship between technology and society is that the role of the state, by either stalling, unleashing, or leading technological innovation, is a decisive factor in the overall process, as it expresses and organizes the social and cultural forces that dominate in a given space and time. To a large extent, technology expresses the ability of a society to propel itself into technological

19 Ito (1994); Japan Informatization Processing Center (1994); for a Western perspective, see Forester (1993).

20 See Norman (1940); Dower (1975); Allen (1981a).

21 Johnson (1995).

mastery through the institutions of society, including the state. The historical process through which this development of productive forces takes place earmarks the characteristics of technology and its interweaving in social relationships.

This is not different in the case of the current technological revolution. It originated and diffused, not by accident, in an historical period of the global restructuring of capitalism, for which it was an essential tool. Thus, the new society emerging from this process of change is both capitalist and informational, while presenting considerable historical variation in different countries, according to their history, culture, institutions, and their specific relationship to global capitalism and information technology.

Informationalism, Industrialism, Capitalism, Statism: Modes of Development and Modes of Production

The information technology revolution was instrumental in allowing the implementation of a fundamental process of restructuring of the capitalist system from the 1980s onwards. In the process, this technological revolution was itself shaped, in its development and manifestations, by the logic and interests of advanced capitalism, without being reducible to the expression of such interests. The alternative system of social organization present in our historical period, statism, also tried to redefine the means of accomplishing its structural goals while preserving the essence of these goals: that is the meaning of restructuring (or *perestroika*, in Russian). Yet Soviet statism failed in its attempt, to the point of collapsing the whole system, to a large extent because of the incapacity of statism to assimilate and use the principles of informationalism embodied in new information technologies, as I shall argue in this book (volume III) on the basis of empirical analysis. Chinese statism seemed to succeed by shifting from statism to state-led capitalism and integration in global economic networks, actually becoming closer to the developmental state model of East Asian capitalism than to the "socialism with Chinese characteristics" of official ideology,[22] as I shall also try to discuss in volume III. None the less, it is highly likely that the process of structural transformation in China will undergo major political conflicts and institutional change in the coming years. The collapse of statism (with rare exceptions, for

22 Nolan and Furen (1990); Hsing (1996).

example, Vietnam, North Korea, Cuba, which are, nevertheless, in the process of linking up with global capitalism) has established a close relationship between the new, global capitalist system, shaped by its relatively successful *perestroika*, and the emergence of informationalism, as the new material, technological basis of economic activity and social organization. Yet both processes (capitalist restructuring, the rise of informationalism) are distinct, and their interaction can only be understood if we separate them analytically. At this point in my introductory presentation of the book's *idées fortes*, it seems necessary to propose some theoretical distinctions and definitions concerning capitalism, statism, industrialism, and informationalism.

It is a well-established tradition in theories of post-industrialism and informationalism, starting with classic works by Alain Touraine[23] and Daniel Bell,[24] to place the distinction between pre-industrialism, industrialism, and informationalism (or post-industrialism) on a different axis from the one opposing capitalism and statism (or collectivism, in Bell's terms). While societies can be characterized along the two axes (so that we have industrial statism, industrial capitalism, and so on), it is essential for the understanding of social dynamics to maintain the analytical distance and empirical interrelation between modes of production (capitalism, statism) and modes of development (industrialism, informationalism). To root these distinctions in a theoretical basis, which will inform the specific analyses presented in this book, it is unavoidable to take the reader, for a few paragraphs, into the somewhat arcane domains of sociological theory.

This book studies the emergence of a new social structure, manifested in various forms, depending on the diversity of cultures and institutions throughout the planet. This new social structure is associated with the emergence of a new mode of development, informationalism, historically shaped by the restructuring of the capitalist mode of production towards the end of the twentieth century.

The theoretical perspective underlying this approach postulates that societies are organized around human processes structured by historically determined relationships of *production, experience,* and *power. Production* is the action of humankind on matter (nature) to appropriate it and transform it for its benefit by obtaining a product, consuming (unevenly) part of it, and accumulating surplus for investment, according to a variety of socially determined goals. *Experience* is the action of human subjects on themselves, determined by the interaction

23 Touraine (1969).

24 Bell (1976). First published 1973, but all quotes are from the 1976 edition, which includes a new, substantial "Foreword 1976."

between their biological and cultural identities, and in relationship to their social and natural environment. It is constructed around the endless search for fulfillment of human needs and desires. *Power* is that relationship between human subjects which, on the basis of production and experience, imposes the will of some subjects upon others by the potential or actual use of violence, physical or symbolic. Institutions of society are built to enforce power relationships existing in each historical period, including the controls, limits, and social contracts achieved in the power struggles.

Production is organized in class relationships that define the process by which some human subjects, on the basis of their position in the production process, decide the sharing and uses of the product in relationship to consumption and investment. Experience is structured around gender/sexual relationships, historically organized around the family, and characterized hitherto by the domination of men over women. Family relationships and sexuality structure personality and frame symbolic interaction.

Power is founded upon the state and its institutionalized monopoly of violence, although what Foucault labels the microphysics of power, embodied in institutions and organizations, diffuses throughout the entire society, from workplaces to hospitals, enclosing subjects in a tight framework of formal duties and informal aggressions.

Symbolic communication between humans, and the relationship between humans and nature, on the basis of production (with its complement, consumption), experience, and power, crystallize over history in specific territories, thus generating *cultures and collective identities.*

Production is a socially complex process because each one of its elements is internally differentiated. Thus, humankind as collective producer includes both labor and the organizers of production, and labor is highly differentiated and stratified according to the role of each worker in the production process. Matter includes nature, human-modified nature, human-produced nature, and human nature itself, the labors of history forcing us to move away from the classic distinction between humankind and nature, since millenniums of human action have incorporated the natural environment into society, making us, materially and symbolically, an inseparable part of this environment. The relationship between labor and matter in the process of work involves the use of means of production to act upon matter on the basis of energy, knowledge, and information. Technology is the specific form of this relationship.

The product of the production process is socially used under two forms: consumption and surplus. Social structures interact with

production processes by determining the rules for the appropriation, distribution, and uses of the surplus. These rules constitute modes of production, and these modes define social relationships of production, determining the existence of social classes that become constituted as such classes through their historical practice. The structural principle under which surplus is appropriated and controlled characterizes a mode of production. In the twentieth century we lived, essentially, with two predominant modes of production: capitalism and statism. Under capitalism, the separation between producers and their means of production, the commodification of labor, and the private ownership of means of production on the basis of the control of capital (commodified surplus), determined the basic principle of appropriation and distribution of surplus by capitalists, although who is (are) the capitalist class(es) is a matter of social inquiry in each historical context, rather than an abstract category. Under statism, the control of surplus is external to the economic sphere: it lies in the hands of the power-holders in the state – let us call them *apparatchiki* or *lingdao*. Capitalism is oriented toward profit-maximizing, that is, toward increasing the amount of surplus appropriated by capital on the basis of the private control over the means of production and circulation. Statism is (was?) oriented toward power-maximizing, that is, toward increasing the military and ideological capacity of the political apparatus for imposing its goals on a greater number of subjects and at deeper levels of their consciousness.

The social relationships of production, and thus the mode of production, determine the appropriation and uses of surplus. A separate yet fundamental question is the level of such surplus, determined by the productivity of a particular process of production, that is by the ratio of the value of each unit of output to the value of each unit of input. Productivity levels are themselves dependent on the relationship between labor and matter, as a function of the use of the means of production by the application of energy and knowledge. This process is characterized by technical relationships of production, defining modes of development. Thus, modes of development are the technological arrangements through which labor works on matter to generate the product, ultimately determining the level and quality of surplus. Each mode of development is defined by the element that is fundamental in fostering productivity in the production process. Thus, in the agrarian mode of development, the source of increasing surplus results from quantitative increases of labor and natural resources (particularly land) in the production process, as well as from the natural endowment of these resources. In the industrial mode of development, the main source of productivity lies in the introduction of new energy sources, and in

the ability to decentralize the use of energy throughout the production and circulation processes. In the new, informational mode of development the source of productivity lies in the technology of knowledge generation, information processing, and symbol communication. To be sure, knowledge and information are critical elements in all modes of development, since the process of production is always based on some level of knowledge and in the processing of information.[25] However, what is specific to the informational mode of development is the action of knowledge upon knowledge itself as the main source of productivity (see chapter 2). Information processing is focused on improving the technology of information processing as a source of productivity, in a virtuous circle of interaction between the knowledge sources of technology and the application of technology to improve knowledge generation and information processing: this is why, rejoining popular fashion, I call this new mode of development informational, constituted by the emergence of a new technological paradigm based on information technology (see chapter 1).

Each mode of development has also a structurally determined performance principle around which technological processes are organized: industrialism is oriented toward economic growth, that is toward maximizing output; informationalism is oriented towards technological development, that is toward the accumulation of knowledge and towards higher levels of complexity in information processing. While higher levels of knowledge may normally result in higher levels of output per unit of input, it is the pursuit of knowledge and information that characterizes the technological production function under informationalism.

Although technology and technical relationships of production are organized in paradigms originating in the dominant spheres of society (for example, the production process, the military–industrial complex) they diffuse throughout the whole set of social relationships and social

25 For the sake of clarity in this book, it is necessary to provide a definition of knowledge and information, even if such an intellectually satisfying gesture introduces a dose of the arbitrary in the discourse, as social scientists who have struggled with the issue know well. I have no compelling reason to improve on Daniel Bell's (1976: 175) own definition of *knowledge*: "Knowledge: a set of organized statements of facts or ideas, presenting a reasoned judgment or an experimental result, which is transmitted to others through some communication medium in some systematic form. Thus, I distinguish knowledge from news and entertainment." As for *information*, some established authors in the field, such as Machlup, simply define information as the communication of knowledge (see Machlup 1962: 15). However, this is because Machlup's definition of knowledge seems to be excessively broad, as Bell argues. Thus, I would rejoin the operational definition of information proposed by Porat in his classic work (1977: 2): "Information is data that have been organized and communicated."

structures, so penetrating and modifying power and experience.[26] Thus, modes of development shape the entire realm of social behavior, of course including symbolic communication. Because informationalism is based on the technology of knowledge and information, there is an especially close linkage between culture and productive forces, between spirit and matter, in the informational mode of development. It follows that we should expect the emergence of historically new forms of social interaction, social control, and social change.

Informationalism and capitalist perestroika

Shifting from theoretical categories to historical change, what truly matters for social processes and forms making the living flesh of societies is the actual interaction between modes of production and modes of development, enacted and fought for by social actors, in unpredictable ways, within the constraining framework of past history and current conditions of technological and economic development. Thus, the world, and societies, would have been very different if Gorbachev had succeeded in his own *perestroika*, a target that was politically difficult, but not out of reach. Or if the Asian Pacific had not been able to blend its traditional business networking form of economic organization with the tools provided by information technology. Yet the most decisive historical factor accelerating, channeling and shaping the information technology paradigm, and inducing its associated social forms, was/is the process of capitalist restructuring undertaken since the 1980s, so that the new techno-economic system can be adequately characterized as *informational capitalism.*

The Keynesian model of capitalist growth, which brought unprecedented economic prosperity and social stability to most market economies for almost three decades after the Second World War, hit the wall of its built-in limitations in the early 1970s, and its crisis was manifested in the form of rampant inflation.[27] When the oil price in-

26 When technological innovation does not diffuse in society, because of institutional obstacles to such diffusion, what follows is technological retardation because of the absence of necessary social/cultural feedback into the institutions of innovation and into the innovators themselves. This is the fundamental lesson that can be drawn from such important experiences as Qing's China or the Soviet Union. For the Soviet Union, see volume III. For China, see Qian (1985) and Mokyr (1990).

27 I presented some years ago my interpretation of the causes of the 1970s' worldwide economic crisis, as well as a tentative prognosis of avenues for capitalist restructuring. Notwithstanding the excessively rigid theoretical framework I juxtaposed to the empirical analysis, I think that the main points I made in that book (written in 1977–8), including the prediction of Reaganomics under that name, are still useful to understand the qualitative changes that operated in capitalism during the last two decades of the twentieth century (see Castells 1980).

creases of 1974 and 1979 threatened to spiral inflation out of control, governments and firms engaged in a process of restructuring in a pragmatic process of trial and error that continued into the 1990s with a more decisive effort at deregulation, privatization, and the dismantling of the social contract between capital and labor that underlay the stability of the previous growth model. In a nutshell, a series of reforms, both at the level of institutions and in the management of firms, aimed at four main goals: deepening the capitalist logic of profit-seeking in capital–labor relationships; enhancing the productivity of labor and capital; globalizing production, circulation, and markets, seizing the opportunity of the most advantageous conditions for profit-making everywhere; and marshaling the state's support for productivity gains and competitiveness of national economies, often to the detriment of social protection and public interest regulations. Technological innovation and organizational change, focusing on flexibility and adaptability, were absolutely critical in ensuring the speed and efficiency of restructuring. It can be argued that without new information technology global capitalism would have been a much-limited reality, flexible management would have been reduced to labor trimming, and the new round of spending in both capital goods and new consumer products would not have been sufficient to compensate for the reduction in public spending. Thus, informationalism is linked to the expansion and rejuvenation of capitalism, as industrialism was linked to its constitution as a mode of production. To be sure, the process of restructuring had very different manifestations in areas and societies around the world, as I shall briefly survey in chapter 2: it was diverted from its fundamental logic by the military Keynesianism of the Reagan administration, actually creating even greater difficulties for the American economy at the end of the euphoria of artificial stimulation; it was somewhat limited in Western Europe because of society's resistance to the dismantling of the welfare state and to one-sided labor market flexibility, with the result of rising unemployment in the European Union; it was absorbed in Japan without dramatic changes by emphasizing productivity and competitiveness on the basis of technology and cooperation rather than by increasing exploitation, until international pressures forced Japan to offshore production and to broadening the role of an unprotected, secondary labor market; and it plunged into a major recession, in the 1980s, the economies of Africa (except South Africa and Botswana) and Latin America (with the exception of Chile and Colombia), when International Monetary Fund policies cut the money supply and reduced wages and imports in order to homogenize conditions of global capital accumulation around the world. Restructuring proceeded

on the basis of the political defeat of organized labor in major capitalist countries, and the acceptance of a common economic discipline by countries of the OECD area. Such discipline, although enforced when necessary by the Bundesbank, the Federal Reserve Board, and the International Monetary Fund, was in fact inscribed in the integration of global financial markets that took place in the early 1980s using new information technologies. Under conditions of global financial integration, autonomous, national monetary policies became literally unfeasible, thus equalizing basic economic parameters of restructuring processes throughout the planet.

While capitalism's restructuring and the diffusion of informationalism were inseparable processes on a global scale, societies did act/react differently to such processes, according to the specificity of their history, culture, and institutions. Thus, to some extent it would be improper to refer to an "informational society," which would imply the homogeneity of social forms everywhere under the new system. This is obviously an untenable proposition, empirically and theoretically. Yet we could speak of an informational society in the same way that sociologists have been referring to the existence of an "industrial society," characterized by common fundamental features in their sociotechnical systems, for instance in Raymond Aron's formulation.[28] But with two important qualifications: on the one hand, informational societies, as they exist currently, are capitalist (unlike industrial societies, some of which were statist); on the other hand, we must stress the cultural and institutional diversity of informational societies. Thus, Japanese uniqueness[29] or Spain's difference[30] is not going to fade away in a process of cultural indifferentiation, marching anew toward universal modernization, this time measured by rates of computer diffusion. Nor is China or Brazil going to be melted in the global pot of informational capitalism by continuing their current high-speed developmental path. But Japan, Spain, China, Brazil, as well as the United States, are and will be more so in the future, informational societies, in the sense that the core processes of knowledge generation, economic productivity, political/military power, and media communication are already deeply transformed by the informational paradigm, and are connected to global networks of wealth, power, and symbols working under such a logic. Thus, all societies are affected by capitalism and informationalism, and many societies (certainly all major societies)

28 Aron (1963).
29 On Japanese uniqueness in a sociological perspective, see Shoji (1990).
30 On the social roots of Spanish differences, and similarities, *vis-à-vis* other countries, see Zaldivar and Castells (1992).

are already informational,[31] although of different kinds, in different settings, and with specific cultural/institutional expressions. A theory of the informational society, as distinct from a global/informational economy, will always have to be attentive to historical/cultural specificity as much as to structural similarities related to a largely shared techno-economic paradigm. As for the actual content of this common social structure that could be considered to be the essence of the new informational society, I'm afraid I am unable to summarize it in one paragraph: indeed, the structure and processes that characterize informational societies are the subject matter covered in this book.

The Self in the Informational Society

New information technologies are integrating the world in global networks of instrumentality. Computer-mediated communication begets

31 I should like to draw an analytical distinction between the notions of "information society" and "informational society," with similar implications for information/informational economy. The term "information society" emphasizes the role of information in society. But I argue that information, in its broadest sense, e.g. as communication of knowledge, has been critical in all societies, including medieval Europe which was culturally structured, and to some extent unified, around scholasticism, that is, by and large an intellectual framework (see Southern 1995). In contrast, the term "informational" indicates the attribute of a specific form of social organization in which information generation, processing, and transmission become the fundamental sources of productivity and power because of new technological conditions emerging in this historical period. My terminology tries to establish a parallel with the distinction between industry and industrial. An industrial society (a usual notion in the sociological tradition) is not just a society where there is industry, but a society where the social and technological forms of industrial organization permeate all spheres of activity, starting with the dominant activities, located in the economic system and in military technology, and reaching the objects and habits of everyday life. My use of the terms "informational society" and "informational economy" attempts a more precise characterization of current transformations beyond the common-sense observation that information and knowledge are important to our societies. However, the actual content of "informational society" has to be determined by observation and analysis. This is precisely the object of this book. For instance, one of the key features of informational society is the networking logic of its basic structure, which explains the use of the concept of "network society," as defined and specified in the conclusion of this volume. However, other components of "informational society," such as social movements or the state, exhibit features that go beyond the networking logic, although they are substantially influenced by such logic, as characteristic of the new social structure. Thus, "the network society" does not exhaust all the meaning of the "informational society." Finally, why, after all these precisions, have I kept *The Information Age* as the overall title of the book, without including medieval Europe in my inquiry? Titles are communicating devices. They should be user-friendly, clear enough for the reader to guess what is the real topic of the book, and worded in a fashion that does not depart excessively from the semantic frame of reference. Thus, in a world built around information technologies, information society, informatization, information superhighway, and the like (all terminologies originated in Japan in the mid-1960s – *johoka shakai*, in Japanese – and transmitted to the west in 1978 by Simon Nora and Alain Minc, indulging in exoticism), a title such as *The Information Age* points straightforwardly to the questions to be raised, without prejudging the answers.

a vast array of virtual communities. Yet the distinctive social and political trend of the 1990s was the construction of social action and politics around primary identities, either ascribed, rooted in history and geography, or newly built in an anxious search for meaning and spirituality. The first historical steps of informational societies seem to characterize them by the pre-eminence of identity as their organizing principle. I understand by identity the process by which a social actor recognizes itself and constructs meaning primarily on the basis of a given cultural attribute or set of attributes, to the exclusion of a broader reference to other social structures. Affirmation of identity does not necessarily mean incapacity to relate to other identities (for example, women still relate to men) or to embrace the whole society under such identity (for example, religious fundamentalism aspires to convert everybody). But social relationships are defined *vis-à-vis* the others on the basis of those cultural attributes that specify identity. For instance, Yoshino, in his study on *nihonjiron* (ideas of Japanese uniqueness), pointedly defines cultural nationalism as "the aim to regenerate the national community by creating, preserving or strengthening a people's cultural identity when it is felt to be lacking, or threatened. The cultural nationalist regards the nation as the product of its unique history and culture and as a collective solidarity endowed with unique attributes."[32] Calhoun, although rejecting the historical newness of the phenomenon, has also emphasized the decisive role of identity in defining politics in contemporary American society, particularly in the women's movement, in the gay movement, in the civil rights movement, movements "that sought not only various instrumental goals but the affirmation of excluded identities as publicly good and politically salient."[33] Alain Touraine goes further, arguing that "in a post-industrial society, in which cultural services have replaced material goods at the core of production, *it is the defense of the subject, in its personality and in its culture, against the logic of apparatuses and markets, that replaces the idea of class struggle.*"[34] Then the key issue becomes, as stated by Calderon and Laserna, in a world characterized by simultaneous globalization and fragmentation, "how to combine new technologies and collective memory, universal science and communitarian cultures, passion and reason?"[35] How, indeed! And why do we observe the opposite trend throughout the world, namely, the increasing distance between globalization and identity, between the Net and the self?

32 Yoshino (1992: 1).
33 Calhoun (1994: 4).
34 Touraine (1994: 168; my translation, his italics).
35 Calderon and Laserna (1994: 90; my translation).

Raymond Barglow, in his illuminating essay on this matter, from a socio-psychoanalytical perspective, points to the paradox that while information systems and networking augment human powers of organization and integration, they simultaneously subvert the traditional Western concept of a separate, independent subject: "The historical shift from mechanical to information technologies helps to subvert the notions of sovereignty and self-sufficiency that have provided an ideological anchoring for individual identity since Greek philosophers elaborated the concept more than two millennia ago. In short, technology is helping to dismantle the very vision of the world that in the past it fostered."[36] Then he goes on to present a fascinating comparison between classic dreams reported in Freud's writing and his own patients' dreams in the high-tech environment of 1990s' San Francisco: "Image of a head . . . and behind it is suspended a computer keyboard . . . I'm this programmed head!"[37] This feeling of absolute solitude is new in comparison to classic Freudian representation: "the dreamers . . . express a sense of solitude experienced as existential and inescapable, built into the structure of the world . . . Totally isolated, the self seems irretrievably lost to itself."[38] Thus, the search for new connectedness around shared, reconstructed identity.

However insightful, this hypothesis may be only part of the explanation. On the one hand, it would imply a crisis of the self limited to a Western individualist conception, shaken by uncontrollable connectedness. Yet the search for new identity and new spirituality is on also in the East, in spite of a stronger sense of collective identity and the traditional, cultural subordination of the individual to the family. The resonance of *Aum Shinrikyo* in Japan in 1995, particularly among the young, highly educated generations, could be considered a symptom of the crisis of established patterns of identity, coupled with the desperate need to build a new, collective self, significantly mixing spirituality, advanced technology (chemicals, biology, laser), global business connections, and the culture of millenarianist doom.[39]

On the other hand, elements of an interpretative framework to explain the rising power of identity must also be found at a broader level, in relationship to macro-processes of institutional change, to a large extent connected to the emergence of a new global system. Thus, widespread currents of racism and xenophobia in Western Europe may

36 Barglow (1994: 6).
37 Barglow (1994: 53).
38 Barglow (1994: 185).
39 For the new forms of revolt linked to identity in explicit opposition to globalization, see the exploratory analysis undertaken in Castells et al. (1996).

be related, as Alain Touraine[40] and Michel Wieviorka[41] have suggested, to an identity crisis on becoming an abstraction (European), at the same time that European societies, while seeing their national identity blurred, discovered within themselves the lasting existence of ethnic minorities in European societies (a demographic fact since at least the 1960s). Or again, in Russia and the ex-Soviet Union, the strong development of nationalism in the post-communist period can be related, as I shall argue in volume III, to the cultural emptiness created by 70 years of imposition of an exclusionary ideological identity, coupled with the return to primary, historical identity (Russian, Georgian), as the only source of meaning after the crumbling of the historically fragile *sovetskii narod* (Soviet people).

The emergence of religious fundamentalism seems also to be linked both to a global trend and to an institutional crisis. We know from history that ideas and beliefs of all brands are always in stock waiting to catch fire under the right circumstances.[42] It is significant that fundamentalism, whether Islamic or Christian, has spread, and will spread, throughout the world at the historical moment when global networks of wealth and power connect nodal points and valued individuals throughout the planet, while disconnecting, and excluding, large segments of societies, regions, and even entire countries. Why did Algeria, one of the most modernized Muslim societies, suddenly turn to fundamentalist saviors, who became terrorists (as did their anti-colonialist predecessors) when they were denied their electoral victory in democratic elections? Why did the traditionalist teachings of Pope John Paul II find an indisputable echo among the impoverished masses of the Third World, so that the Vatican could afford to ignore the protests of a minority of feminists in a few advanced countries where the progress of reproductive rights contributes precisely to diminishing the number of souls to be saved? There seems to be a logic of excluding the excluders, of redefining the criteria for value and meaning in a world where there is shrinking room for the computer illiterate, for consumptionless groups, and for under-communicated territories. When the Net switches off the self, the self, individual or collective, constructs its meaning without global, instrumental reference: the process of disconnection becomes reciprocal, following the refusal by the excluded of the one-sided logic of structural domination and social exclusion.

Such is the terrain to be explored, not just declared. The few ideas

40 Touraine (1991).
41 Wieviorka (1993).
42 See, for instance, Colas (1992); Kepel (1993).

advanced here on the paradoxical manifestation of the self in the informational society are only intended to chart the course of my inquiry for the reader's information, not to draw conclusions beforehand.

A Word on Method

This is not a book about books. While relying on evidence of various sorts, and on analyses and accounts from multiple sources, it does not intend to discuss existing theories of post-industrialism or the information society. Several thorough, balanced presentations of these theories are available,[43] as well as various critiques,[44] including my own.[45] Similarly, I shall not contribute, except when necessary for the sake of the argument, to the cottage industry created in the 1980s around postmodern theory,[46] being for my part fully satisfied with the excellent criticism elaborated by David Harvey on the social and ideological foundations of "post-modernity,"[47] as well as with the sociological dissection of postmodern theories performed by Scott Lash.[48] I certainly owe many thoughts to many authors, and particularly to the forebears of informationalism, Alain Touraine and Daniel Bell, as well as to the one Marxist theorist who sensed the new, relevant issues just before his death in 1979, Nicos Poulantzas.[49] And I duly acknowledge borrowed concepts when I use them as tools in my specific analyses. Yet I have tried to construct a discourse as autonomous and non-redundant as possible, integrating materials and observations from various sources, without submitting the reader to the painful revisiting of the bibliographical jungle where I have lived (fortunately, among other activities) for the past 12 years.

In a similar vein, while using a significant amount of statistical sources and empirical studies, I have tried to minimize the processing of data to simplify an already excessively cumbersome book. Therefore, I tend

43 A useful overview of sociological theories on post-industrialism and informationalism is Lyon (1988). For the intellectual and terminological origins of notions of "information society," see Nora and Minc (1978) and Ito (1991a). See also Beniger (1986); Katz (1988); Williams (1988); Salvaggio (1989).

44 For critical perspectives on post-industrialism, see, among others, Woodward (1980); Roszak (1986); Lyon (1988); Shoji (1990); Touraine (1992). For a cultural critique of our society's emphasis on information technology, see Postman (1992).

45 For my own critique of post-industrialism, see Castells (1994, 1996).

46 See Lyon (1994); also Seidman and Wagner (1992).

47 Harvey (1990).

48 Lash (1990).

49 Poulantzas (1978: esp. 160–9).

to use data sources that find broad, accepted consensus among social scientists (for example, OECD, United Nations, World Bank, governments' official statistics, authoritative research monographs, generally reliable academic or business sources), except when such sources seem to be erroneous (such as Soviet GNP statistics or the World Bank's report on adjustment policies in Africa). I am aware of limitations in lending credibility to information that may not always be accurate, yet the reader will realize that numerous precautions have been taken in this text to form conclusions usually on the basis of convergent trends from several sources, according to a methodology of triangulation with a well-established, successful tradition among historians, policemen, and investigative reporters. Furthermore, the data, observations, and references presented in this book do not really aim at demonstrating but at suggesting hypotheses while constraining the ideas within a corpus of observation, admittedly selected with my research questions in mind but certainly not organized around preconceived answers. The methodology followed in this book, whose specific implications will be discussed in each chapter, is at the service of the overarching purpose of its intellectual endeavor: to propose some elements of an exploratory, cross-cultural theory of economy and society in the Information Age, *as it specifically refers to the emergence of a new social structure.* The broad scope of my analysis is required by the pervasiveness of the object of such analysis (informationalism) throughout social domains and cultural expressions. But I certainly do not intend to address the whole range of themes and issues in contemporary societies – since writing encyclopedias is not my trade.

The book is divided into three parts which the publisher has wisely transformed into three volumes. They are analytically interrelated, but they have been organized to make their reading independent. The only exception to this rule concerns the Conclusion, in volume III, which is the overall conclusion of the book, and presents a synthetic interpretation of its findings and ideas.

The division into three volumes, while making the book publishable and readable, raises some problems in communicating my overall theory. Indeed, some critical topics that cut across all the themes treated in this book are presented in the second volume. Such is the case, particularly, of the analysis of women and patriarchalism, and of power relationships and the state. I warn the reader that I do not share a traditional view of society as made up of superimposed levels, with technology and economy in the basement, power on the mezzanine, and culture in the penthouse. Yet, for the sake of clarity, I am forced to a systematic, somewhat linear presentation of topics which, while relating to each other, cannot fully integrate all the elements until they

have been discussed in some depth throughout the intellectual journey on which the reader is invited by this book. The first volume, in the reader's hands, deals primarily with the logic of what I call the Net, while the second (*The Power of Identity*) analyzes the formation of the self, and the interaction between the Net and the self in the crisis of two central institutions of society: the patriarchal family and the nation-state. The third volume (*End of Millennium*) attempts an interpretation of historical transformations in the last lapse of the twentieth century, as a result of the dynamics of processes studied in the first two volumes. It is only at the end of the third volume that a general integration between theory and observation, linking up the analyses concerning the various domains, will be proposed, although each volume concludes with an effort at synthesizing the main findings and ideas presented in the volume. While volume III is more directly concerned with specific processes of historical change in various contexts, throughout the whole book I have tried my best to accomplish two goals: to ground analysis in observation, without reducing theorization to commentary; and to diversify culturally my sources of observation *and of ideas*, as much as possible. This approach stems from my conviction that we have entered a truly multicultural, interdependent world, which can only be understood, and changed, from a plural perspective that brings together cultural identity, global networking, and multidimensional politics.

6

The Space of Flows

Space and time are the fundamental, material dimensions of human life. Physicists have unveiled the complexity of such notions, beyond their fallacious intuitive simplicity. School children know that space and time are related. And superstring theory, the latest fashion in physics, advances the hypothesis of a hyperspace that articulates ten dimensions, including time.[1] There is of course no place for such a discussion in my analysis, strictly concerned with the *social meaning of space and time*. But my reference to such complexity goes beyond rhetorical pedantry. It invites us to consider social forms of time and space that are not reducible to what have been our perceptions to date, based upon socio-technical structures superseded by current historical experience.

Since space and time are intertwined in nature and in society, so they will be in my analysis, although for the sake of clarity I shall focus sequentially first on space, in this chapter, and then on time in the next one. The ordering in the sequence is not random: unlike most classical social theories, which assume the domination of space by time, I propose the hypothesis that space organizes time in the network society. This statement will, I hope, make more sense at the end of the intellectual journey I propose to the reader in these two chapters.

Both space and time are being transformed under the combined effect of the information technology paradigm, and of social forms and processes induced by the current process of historical change, as presented in this book. However, the actual profile of this transformation sharply departs from common-sense extrapolations of technological determinism. For instance, it appears to be obvious that

1 Kaku (1994).

advanced telecommunications would make location of offices ubiquitous, thus enabling corporate headquarters to quit expensive, congested, and unpleasant central business districts for custom-made sites in beautiful spots around the world. Yet Mitchell Moss's empirical analysis of the impact of telecommunications on Manhattan's business in the 1980s found that these new, advanced telecommunications facilities were among the factors responsible for slowing down corporate relocation away from New York, for reasons that I shall expose below. Or, to use another example on a different social domain, home-based electronic communication was supposed to induce the decline of dense urban forms, and to diminish spatially localized social interaction. Yet the first mass diffused system of computer-mediated communication, the French Minitel, described in chapter 5, originated in the 1980s in an intense urban environment, whose vitality and face-to-face interaction was hardly undermined by the new medium. Indeed, French students used Minitel to successfully stage *street* demonstrations against the government. In the early 1990s telecommuting – that is, working at home on-line – was practiced by a very small fraction of the labor force, in the United States (between 1 and 2 percent on a given day), Europe, or Japan, if we except the old, customary practice of professionals to keep working at home or to organize their activity in flexible time and space when they have the leisure to do so.[2] While working at home part-time seems to be emerging as a mode of professional activity in the future, it develops out of the rise of the network enterprise and of the flexible work process, as analyzed in preceding chapters, not as the direct consequence of available technology. The theoretical and practical consequences of such precisions are critical. It is this complexity of the interaction between technology, society, and space that I shall address in the following pages.

To proceed in this direction, I shall examine the empirical record on the transformation of location patterns of core economic activities under the new technological system, both for advanced services and for manufacturing. Afterwards, I shall try to assess the scarce evidence on the interaction between the rise of the electronic home and the evolution of the city, and I shall elaborate on the recent evolution of urban forms in various contexts. I shall then synthesize the observed tendencies under a new spatial logic that I label *space of flows*. I shall oppose to such logic the historically rooted spatial organization of our common

2 For an excellent overview of the interaction between telecommunications and spatial processes, see Graham and Marvin (1996). For evidence of the impact of telecommunications on business districts, see Moss (1987, 1991, 1992: 147–58). For a summary of the evidence on teleworking and telecommuting in advanced societies, see Korte et al. (1988); and Qvortup (1992).

experience: *the space of places.* And I shall refer to the reflection of such dialectical opposition between the space of flows and the space of places in current debates in architecture and urban design. The purpose of this intellectual itinerary is to draw the profile of this new spatial process, the space of flows, that is becoming the dominant spatial manifestation of power and function in our societies. In spite of all my efforts to anchor the new spatial logic in the empirical record, I am afraid it is unavoidable, toward the end of the chapter, to confront the reader with some fundamentals of a social theory of space, as a way to approach the current transformation of the material basis of our experience. Yet my ability to communicate a rather abstract theorization of new spatial forms and processes will, I hope, be enhanced by a brief survey of available evidence on recent spatial patterning of dominant economic functions and social practices.[3]

Advanced Services, Information Flows, and the Global City

The informational, global economy is organized around command and control centers able to coordinate, innovate, and manage the intertwined activities of networks of firms.[4] Advanced services, including finance, insurance, real estate, consulting, legal services, advertising, design, marketing, public relations, security, information gathering, and management of information systems, but also R&D and scientific innovation, are at the core of all economic processes, be it in manufacturing, agriculture, energy, or services of different kinds.[5] They all can be reduced to knowledge generation and information flows.[6] Thus, advanced telecommunications systems could make possible their

3 To a large extent, the empirical basis and the analytical foundations of this chapter rely on the research work I did in the 1980s, summarized and elaborated in my book *The Informational City: Information Technology, Economic Restructuring, and the Urban–Regional Process* (Castells 1989b). Although this chapter contains updated, additional information on various countries, as well as further theoretical elaboration, I still refer the reader to the cited book for more detailed analysis and empirical support of the analysis presented here. Accordingly, *I shall not repeat here the empirical sources that have been used and cited in the above-mentioned book.* This note should be considered as a generic reference to the sources and material contained in *The Informational City.* For an up-to-date discussion on these matters, see also Graham and Marvin (1996; 2000). For an historical, analytical, and cultural overview of the evolution of cities, see the masterpiece by Sir Peter Hall (1998). For an international perspective on urbanization, see Borja and Castells (1997).

4 For an excellent overview of current transformations of spatial forms and processes at the global level, see Hall (1995: 3–32).

5 Daniels (1993).

6 Norman (1993).

scattered location around the globe. Yet more than a decade of studies on the matter have established a different spatial pattern, characterized by the simultaneous dispersion and concentration of advanced services.[7] On the one hand, advanced services have substantially increased their share in employment and GNP in most countries, and they display the highest growth in employment and the highest investment rates in the leading metropolitan areas of the world.[8] They are pervasive, and they are located throughout the geography of the planet, excepting the "black holes" of marginality. On the other hand, there has been a spatial concentration of the upper tier of such activities in a few nodal centers of a few countries.[9] This concentration follows a hierarchy between tiers of urban centers, with the higher-level functions, in terms of both power and skill, being concentrated in some major metropolitan areas.[10] Saskia Sassen's classic study of the global city has shown the joint dorninance of New York, Tokyo, and London in international finance, and in most consulting and business services of international scope.[11] These three centers together cover the spectrum of time zones for the purpose of financial trading, and work largely as a unit in the same system of endless transactions. But other centers are important, and even more pre-eminent in some specific segments of trade, for example Chicago and Singapore in futures' contracts (in fact, first practiced in Chicago in 1972). Hong Kong, Osaka, Frankfurt, Zurich, Paris, Los Angeles, San Francisco, Amsterdam, and Milan are also major centers both in finance and in international business services.[12] And a number of "regional centers" are rapidly joining the network, as "emerging markets" develop all over the world: Madrid, São Paulo, Buenos Aires, Mexico, Taipei, Moscow, Budapest, among others.

As the global economy expands and incorporates new markets it also organizes the production of advanced services required to manage the new units joining the system, and the conditions of their ever-changing linkages.[13] A case in point which illustrates this process is Madrid, relatively a backwater of the global economy until 1986. In that year Spain joined the European Community, opening up fully to foreign capital investment in the stock exchange markets, in banking operations, and in acquisition of companies equity, as well as in real

7 Graham (1994).
8 Enderwick (1989).
9 Daniels (1993).
10 Thrift (1986); Thrift and Leyshon (1992).
11 Sassen (1991).
12 Daniels (1993).
13 Borja et al. (1991).

estate. As shown in our study,[14] in the 1986–90 period foreign direct investment in Madrid and in Madrid's stock exchange fueled a period of rapid regional economic growth, together with a boom in real estate and a fast expansion of employment in business services. Acquisitions of stocks in Madrid by foreign investors between 1982 and 1988 jumped from 4,494 million pesetas (pts) to 623,445 million pts. Foreign direct investment in Madrid went up from 8,000 million pts in 1985 to almost 400,000 million pts in 1988. Accordingly, office construction in downtown Madrid, and high-level residential real estate, went in the late 1980s through the same kind of frenzy experienced in New York and London. The city was deeply transformed both through the saturation of valuable space in the core city, and through a process of massive suburbanization which, until then, had been a somewhat limited phenomenon in Madrid.

Along the same line of argument, a study by Cappelin on services networking in European cities shows the increasing interdependence and complementarity between medium-sized urban centers in the European Union. He concluded that: "The relative importance of the city–region relationships seems to decrease with respect to the importance of the relationships which interlink various cities of different regions and countries . . . New activities concentrate in particular poles and that implies an increase of disparities between the urban poles and their respective hinterlands."[15] Thus, the global city phenomenon cannot be reduced to a few urban cores at the top of the hierarchy. It is a process that connects advanced services, producer centers, and markets in a global network, with different intensity and at a different scale depending upon the relative importance of the activities located in each area *vis-à-vis* the global network. Inside each country, the networking architecture reproduces itself into regional and local centers, so that the whole system becomes interconnected at the global level. Territories surrounding these nodes play an increasingly subordinate function, sometimes becoming irrelevant or even dysfunctional; for example, Mexico City's *colonias populares* (originally squatter settlements) that account for about two-thirds of the megapolitan population, without playing any distinctive role in the functioning of Mexico City as an international business center.[16] Furthermore, globalization stimulates regionalization. In his studies on European regions in the 1990s, Philip Cooke has shown, on the basis of available evidence, that the growing internationalization of economic activities through-

14 For a summary of the research report, see Castells (1991).
15 Cappelin (1991): 237.
16 Davis (1994).

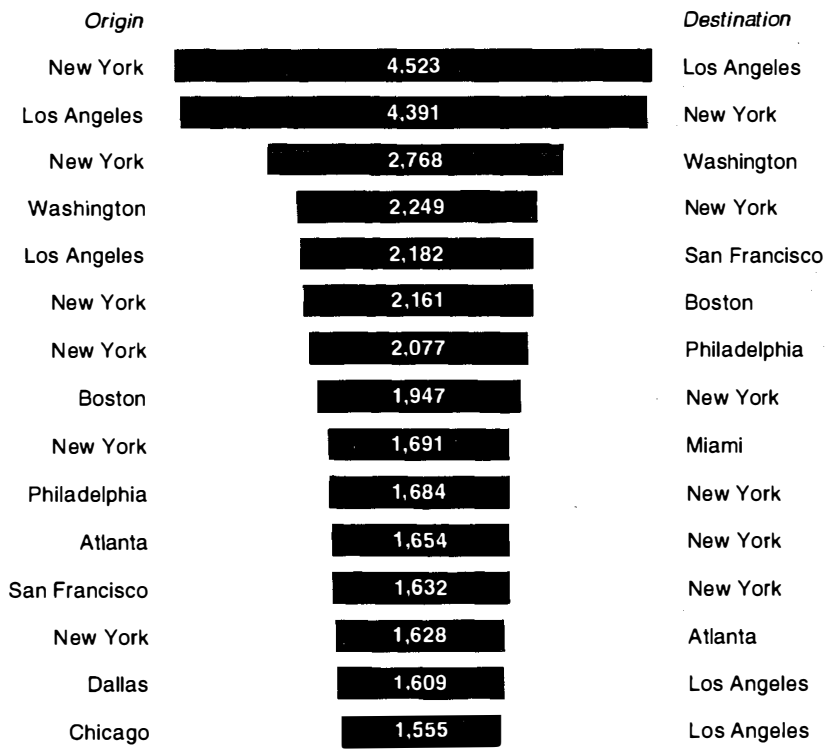

Figure 6.1 Largest absolute growth in information flows, 1982 and 1990
Source: Federal Express data, elaborated by Michelson and Wheeler (1994)

out Europe has made regions more dependent on these activities. Accordingly, regions, under the impulse of their governments and business elites, have restructured themselves to compete in the global economy, and they have established networks of cooperation between regional institutions and between region-based companies. Thus, regions and localities do not disappear, but become integrated in international networks that link up their most dynamic sectors.[17]

An approximation to the evolving architecture of information flows in the global economy has been obtained by Michelson and Wheeler on the basis of data analysis of traffic for one of the leading business couriers, Federal Express Corporation.[18] They studied the 1990s' move-

17 Cooke and Morgan (1993); Cooke (1994).
18 Michelson and Wheeler (1994).

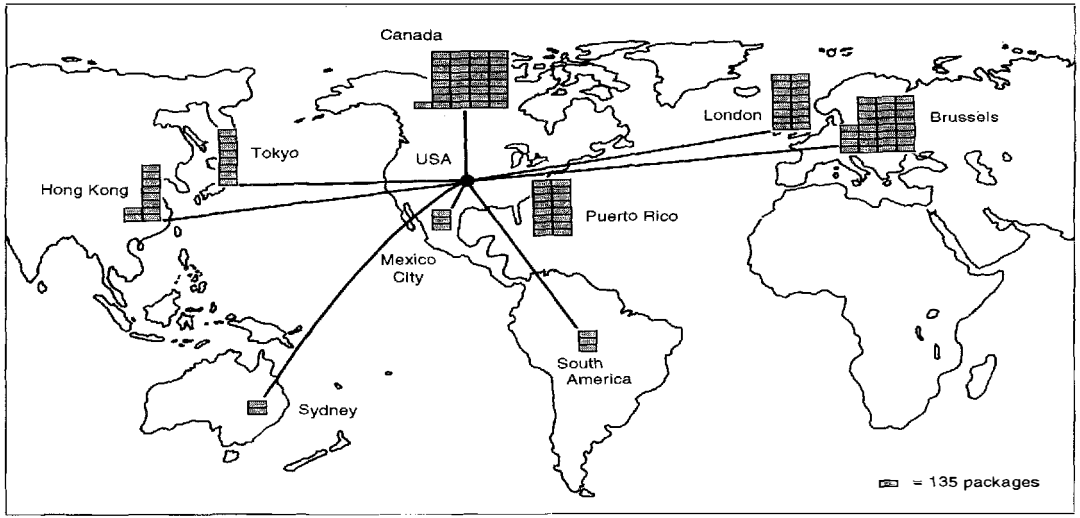

Figure 6.2 Exports of information from the United States to major world regions and centers
Source: Federal Express data, 1990, elaborated by Michelson and Wheeler (1994)

ment of overnight letters, packages, and boxes between US metropolitan areas, as well as between the US major sending centers and international destinations. The results of their analysis, illustrated in figures 6.1 and 6.2 show two basic trends: (a) dominance of some nodes, particularly New York, followed by Los Angeles, increasing over time; (b) selected national and international circuits of connection. As they conclude:

> All indicators point to a strengthening of the hierarchical structure of command-and-control functions and the resulting exchange of information . . . The locational concentration of information results from high levels of uncertainty, driven in turn by technological change, market demassification, deregulation and market globalization. . . . [However] as the current epoch unfolds, the importance of flexibility as a basic coping mechanism, and of agglomeration economies as the preeminent locational force will persist. The importance of the city as a center of gravity for economic transactions thus will not vanish. But with the impending regulation of international markets . . . with less uncertainty about the rules of the economic game and the players involved, the concentration of the information industry will slow and certain aspects of production and distribution will filter into lower levels of an internationalized urban hierarchy.[19]

Indeed, the hierarchy in the network is by no means assured or stable: it is subject to fierce inter-city competition, as well as to the venture of highly risky investments in both finance and real estate. Thus, P. W. Daniels, in one of the most comprehensive studies of the matter, explains the partial failure of the major redevelopment project of Canary Wharf in London's Docklands as the result of the overextended strategy of its developer, the notorious Canadian firm Olympia & York, unable to absorb the office development glut of the early 1990s, in the wake of retrenchment of financial services employment in both London and New York. He concludes that:

> The expansion of services into the international market place has therefore introduced a greater degree of flexibility, and ultimately competition, into the global urban system than was the case in the past. As the experience with Canary Wharf has shown, it also made the outcome of large-scale planning and redevelopment within cities a hostage to external international factors over which they can have limited control.[20]

Thus, in the early 1990s, while business-led explosive urban growth

19 Michelson and Wheeler (1994: 102–3).
20 Daniels (1993: 166).

was experienced in cities such as Bangkok, Taipei, Shanghai, Mexico DF, or Bogota, on the other hand, Madrid, along with New York, London, and Paris, went into a slump that triggered a sharp downturn in real-estate prices and halted new construction. Then, in the late 1990s, London's and New York's real estate revalued substantially, while the urban cores of major Asian cities were severely struck by a financial crisis, partly induced by the bursting of the bubble of their real-estate markets (see volume III). This urban roller-coaster at different periods, across areas of the world, illustrates both the dependence and vulnerability of any locale, including major cities, to changing global flows.

But why must these advanced service systems still be dependent on agglomeration in a few large metropolitan nodes? Here again, Saskia Sassen, capping years of field work research by herself and other researchers in different contexts, offers convincing answers. She argues that:

> The combination of spatial dispersal and global integration has created a new strategic role for major cities. Beyond their long history as centers for international trade and banking, these cities now function in four new ways: first, as highly concentrated command points in the organization of the world economy; second, as key locations for finance and for specialized service firms . . . ; third, as sites of production, including the production of innovation in these leading industries; and fourth, as markets for the products and innovations produced.[21]

These cities, or rather, their business districts, are information-based, value-production complexes, where corporate headquarters and advanced financial firms can find both the suppliers and the highly skilled, specialized labor they require. They constitute indeed networks of production and management, whose flexibility needs *not* to internalize workers and suppliers, but to be able to access them when it fits, and in the time and quantities that are required in each particular instance. Flexibility and adaptability are better served by this combination between agglomeration of core networks, and global networking of these cores, and of their dispersed, ancillary networks, via telecommunications and air transportation. Other factors seem also to contribute to strengthen concentration of high-level activities in a few nodes: once they are constituted, heavy investment in valuable real estate by corporations explains their reluctance to move because such a move would devalue their fixed assets; also, face-to-face contacts for critical

21 Sassen (1991: 3–4).

decisions are still necessary in the age of widespread eavesdropping, since, as Saskia Sassen reports that a manager confessed to her during an interview, sometimes business deals are, of necessity, marginally illegal.[22] And, finally, major metropolitan centers still offer the greatest opportunities for the personal enhancement, social status, and individual self-gratification of the much-needed upper-level professionals, from good schools for their children to symbolic membership at the heights of conspicuous consumption, including art and entertainment.[23]

Nevertheless, advanced services, and even more so services at large, do indeed disperse and decentralize to the periphery of metropolitan areas, to smaller metropolitan areas, to less-developed regions, and to some less-developed countries.[24] New regional centers of service processing activities have emerged in the United States (for example, Atlanta, Georgia, or Omaha, Nebraska), in Europe (for example, Barcelona, Nice, Stuttgart, Bristol), or in Asia (for example, Bombay, Bangkok, Shanghai). The peripheries of major metropolitan areas are bustling with new office development, be it Walnut Creek in San Francisco or Reading near London. And in some cases, new major service centers have sprung up on the edge of the historic city, Paris's La Défense being the most notorious and successful example. Yet, in almost all instances, decentralization of office work affects "back offices;" that is, the mass processing of transactions that execute strategies decided and designed in the corporate centers of high finance and advanced services.[25] These are precisely the activities that employ the bulk of semi-skilled office workers, most of them suburbanite women, many of them replaceable or recyclable, as technology evolves and the economic roller-coaster goes on.

What is significant about this spatial system of advanced service activities is neither their concentration nor decentralization, since both processes are indeed taking place at the same time throughout countries and continents. Nor is it the hierarchy of their geography, since this is in fact tributary to the variable geometry of money and information flows. After all, who could predict in the early 1980s that Taipei, Madrid, or Buenos Aires could emerge as important international financial and business centers? I believe that the megalopolis Hong Kong–Shenzhen–Guangzhou–Zhuhai–Macau will be one of the major

22 Personal notes, reported by Sassen over a glass of Argentinian wine, Harvard Inn, April 22, 1994.

23 For an approximation to the differentiation of social worlds in global cities, using New York as an illustration, see the various essays collected in Mollenkopf (1989); and Mollenkopf and Castells (1991); see also Zukin (1992).

24 For evidence on spatial decentralization of services, see Marshall et al. (1988); Castells (1989b: ch. 3); Daniels (1993: ch. 5).

25 See Castells (1989b: ch.3); and Dunford and Kafkalas (1992).

financial and business capitals in the early twenty-first century, thus inducing a major realignment in the global geography of advanced services.[26] But for the sake of the spatial analysis I am proposing here, it is secondary if I miss my prediction. Because, while the actual location of high-level centers in each period is critical for the distribution of wealth and power in the world, from the perspective of the spatial logic of the new system what matters is the versatility of its networks. The global city is not a place, but a process. A process by which centers of production and consumption of advanced services, and their ancillary local societies, are connected in a global network, while simultaneously downplaying the linkages with their hinterlands, on the basis of information flows.

The New Industrial Space

The advent of high-technology manufacturing, namely microelectronics-based, computer-aided manufacturing, ushered in a new logic of industrial location. Electronic firms, the producers of new information technology devices, were also the first to practice the locational strategy both allowed and required by the information-based production process. During the 1980s, a number of empirical studies conducted by faculty and graduate students at the University of California Berkeley's Institute of Urban and Regional Development provided a solid grasp on the profile of "the new industrial space."[27] It is characterized by the technological and organizational ability to separate the production process in different locations while reintegrating its unity through telecommunications linkages, and micro-electronics-based precision and flexibility in the fabrication of components. Furthermore, geographical specificity of each phase of the production process is made advisable by the singularity of the labor force required at each stage, and by the different social and environmental features involved in the living conditions of highly distinct segments of this labor force. This is because high-technology manufacturing presents an occupational composition very different from traditional manufacturing: it is organized in a bipolar structure around two predominant groups of roughly similar size; a highly skilled, science- and technology-based labor force, on the one hand; and a mass of unskilled workers engaged in routine assembly and auxiliary operations,

26 See Henderson (1991); Kwok and So (1992, 1995).

27 For an analytical summary of the evidence gathered by these studies on new patterns of manufacturing location, see Castells (1988a). See also Scott (1988); Henderson (1989).

on the other hand. While automation has increasingly enabled companies to eliminate the lower tier of workers, the staggering increase in the volume of production still employs, and will for some time, a considerable number of unskilled and semi-skilled workers whose location in the same areas as scientists and engineers is neither economically feasible nor socially suitable, in the prevailing social context. In between, skilled operators also represent a distinctive group that can be separated from the high levels of high-technology production. Because of the light weight of the final product, and because of easy communication linkages developed by companies throughout the globe, electronics firms, particularly American, developed from the beginnings of the industry (as early as Fairchild's plant location in Hong Kong in 1962) a locational pattern characterized by the international spatial division of labor.[28] Roughly speaking, both for micro-electronics and computers, four different types of location were sought for each one of the four distinctive operations in the production process:

1 R&D, innovation, and prototype fabrication were concentrated in highly innovative industrial centers in core areas, generally with good quality of life before their development process degraded the environment to some extent.
2 Skilled fabrication in branch plants, generally in newly industrializing areas in the home country, which in the case of the US generally meant in medium-sized towns in the Western states.
3 Semi-skilled, large-scale assembly and testing work that from the very beginning was located offshore in a substantial proportion, particularly in South-East Asia, with Singapore and Malaysia pioneering the movement of attracting factories of American electronics corporations.
4 Customization of devices and aftersales maintenance and technical support, which was organized in regional centers throughout the globe, generally in the area of major electronics markets, originally in America and Western Europe, although in the 1990s the Asian markets rose to equal status.

European companies, used to cozy locations on their protected home turfs, were pushed to decentralize their production systems in a similar global chain, as markets opened up, and they started to feel the pinch of competition from Asian-based operations, and from American and Japanese technological advantage.[29] Japanese companies tried

28 Cooper (1994).
29 Chesnais (1994).

to resist for a long time quitting "fortress Japan," both for reasons of nationalism (at the request of their government) and because of their close dependence on "just-in-time" networks of suppliers. However, unbearable congestion and sky-rocketing prices of operation in the Tokyo–Yokohama area forced first regional decentralization (helped by MITI's Technopolis Program) in less-developed areas of Japan, particularly in Kyushu;[30] and then, from the late 1980s, Japanese companies proceeded to follow the locational pattern initiated by their American competitors two decades earlier: offshore production facilities in South-East Asia, searching for lower labor costs and looser environmental constraints, and dissemination of factories throughout the main markets in America, Europe, and Asia in order to pre-empt future protectionism.[31] Thus, the end of Japanese exceptionalism confirmed the accuracy of the locational model that, together with a number of colleagues, we proposed to understand the new spatial logic of high-technology industry. Figure 6.3 displays schematically the spatial logic of this model, elaborated on the basis of empirical evidence gathered by a number of researchers in different contexts.[32]

A key element in this locational pattern is the decisive importance of technological innovation production complexes for the whole system. This is what Peter Hall and I, as well as the pioneer in this field of research, Philippe Aydalot, called "milieux of innovation."[33] By milieu of innovation I understand a specific set of relationships of production and management, based on a social organization that by and large shares a work culture and instrumental goals aimed at generating new knowledge, new processes, and new products. Although the concept of milieu does not necessarily include a spatial dimension, I argue that in the case of information technology industries, at least in this century, spatial proximity is a necessary material condition for the existence of such milieux because of the nature of the interaction in the innovation process. What defines the specificity of a milieu of innovation is its capacity to generate synergy; that is, the added value resulting not from the cumulative effect of the elements present in the

30 Castells and Hall (1994).
31 Aoyama (1995).
32 Castells (1989b: ch. 2).
33 The concept of milieu of innovation, as applied to technological/industrial development, emerged in the early 1980s in a series of exchanges, in Berkeley, between Peter Hall, the late Philippe Aydalot, and myself. We were also influenced by some economic writings on the matter, around the same time, by B. Arthur and by A. E. Anderson. Peter Hall and I, in separate papers, attempted formulations of the concept in 1984 and subsequent years; and in Europe the research network originally organized by Philippe Aydalot, the Groupe de Recherche sur les Milieux Innovateurs (GREMI), undertook systematic research on the matter, published in 1986 and subsequent years. Among GREMI researchers, Roberto Camagni provided, in my personal opinion, the most precise analysis on this topic.

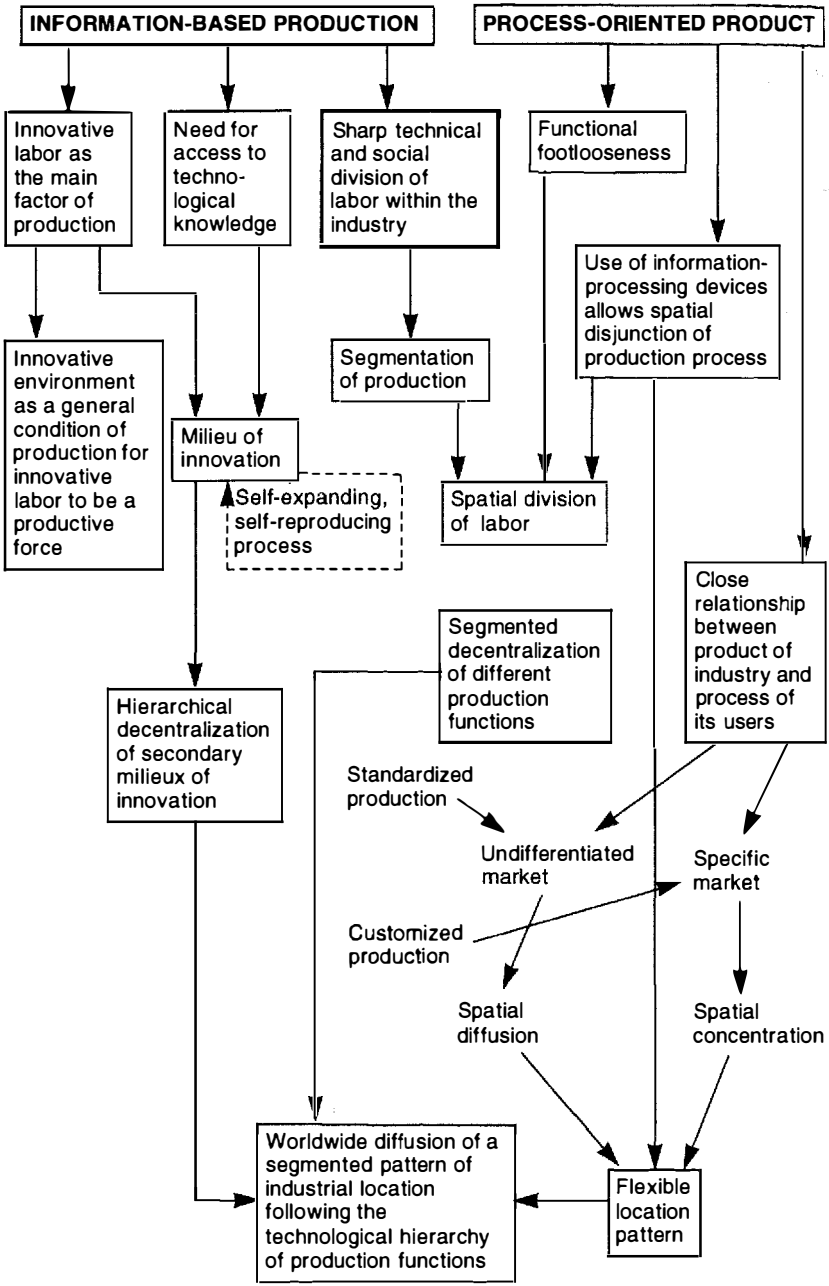

Figure 6.3 System of relationships between the characteristics of information technology manufacturing and the industry's spatial pattern
Source: Castells (1989a)

milieu but from their interaction. Milieux of innovation are the fundamental sources of innovation and of generation of value added in the process of industrial production in the Information Age. Peter Hall and I studied for several years the formation, structure, and dynamics of the main technological milieux of innovation around the world, both actual and supposed. The results of our inquiry added some elements to the understanding of the locational pattern of information technology industry.[34]

First of all, high-technology-led industrial milieux of innovation, which we called "technopoles," come in a variety of urban formats. Most notably, it is clear that in most countries, with the important exceptions of the United States and, to some extent, Germany, the leading technopoles are in fact contained in the leading metropolitan areas: Tokyo, Paris-Sud, London–M4 Corridor, Milan, Seoul–Inchon, Moscow–Zelenograd, and at a considerable distance Nice–Sophia Antipolis, Taipei–Hsinchu, Singapore, Shanghai, São Paulo, Barcelona, and so on. The partial exception of Germany (after all, Munich is a major metropolitan area) relates directly to political history: the destruction of Berlin, the pre-eminent European science-based industrial center, and the relocation of Siemens from Berlin to Munich in the last months of the Third Reich, under the anticipated protection of American occupation forces and with the subsequent support of the Bavarian CSU party. Thus, against the excessive imagery of upstart technopoles there is indeed continuity in the spatial history of technology and industrialization in the Information Age: major metropolitan centers around the world continue to cumulate innovation-inducing factors and to generate synergy, in manufacturing as in advanced services.

However, some of the most important innovation centers of information technology manufacturing are indeed new, particularly in the world's technological leader, the United States. Silicon Valley, Boston's Route 128 (rejuvenating an old, traditional manufacturing structure), the southern California technopole, North Carolina's research triangle, Seattle, and Austin, among others, were by and large linked to the latest wave of information-technology-based industrialization. We have shown that their development resulted from the clustering of specific varieties of the usual factors of production: capital, labor, and raw material, brought together by some kind of institutional entrepreneur, and constituted by a particular form of social organization. Their raw material was made up of new knowledge, related to strategically important fields of application, produced by

34 Castells and Hall (1994).

major centers of innovation, such as Stanford University, CalTech, or MIT schools of engineering research teams, and the networks built around them. Their labor, distinct from the knowledge factor, required the concentration of a large number of highly skilled scientists and engineers, from a variety of locally based schools, including those mentioned above but also others, such as Berkeley, San Jose State, or Santa Clara, in the case of Silicon Valley. Their capital was also specific, willing to take the high risks of investing in pioneering high-tech: either because of the military imperative on performance (defense-related spending), or else because of the high stakes of venture capital betting on the extra rewards of risk-taking investments. The articulation of these production factors was generally the fact, at the onset of the process, of an institutional actor, such as Stanford University launching the Stanford Industrial Park that induced Silicon Valley; or the Air Force commanders who, relying on Los Angeles boosterism, won for southern California the defense contracts that would make the new Western metropolis the largest high-technology defense complex in the world. Finally, social networks, of different kinds, powerfully contributed to the consolidation of the milieu of innovation, and to its dynamism, ensuring the communication of ideas, the circulation of labor, and the cross-fertilization of technological innovation and business entrepreneurialism.

What our research on the new milieux of innovation, in the US or elsewhere, shows is that while there is indeed spatial continuity in metropolitan dominance, it can also be reversed given the right conditions. And that the right conditions concern the capacity to spatially concentrate the proper ingredients for inducing synergy. If such is the case, as our evidence seems to support, then we do have a new industrial space marked by fundamental discontinuity: milieux of innovation, new and old, constitute themselves on the basis of their internal structure and dynamics, later attracting firms, capital, and labor to the seedbed of innovation they constituted. Once established, milieux of innovation both compete and cooperate between different regions, creating a network of interaction that brings them together in a common industrial structure beyond their geographical discontinuity. Research by Camagni and the research teams organized around the GREMI network[35] shows the growing interdependence of these milieux of innovation all over the globe, while at the same time emphasizing how decisive for its fate is the capacity of each milieu to enhance its synergy. Finally, milieux of innovation command global networks of production and distribution that extend their reach all over the

35 Camagni (1991).

planet. This is why some researchers, such as Amin and Robins, argue that the new industrial system is neither global nor local but "a new articulation of global and local dynamics."[36]

However, to have a clear vision of the new industrial space constituted in the Information Age we must add some precision. This is because too often the emphasis of the analysis has been placed on the hierarchical spatial division of labor between different functions located in different territories. This is important, but not essential in the new spatial logic. Territorial hierarchies can be blurred, and even reversed, as the industry expands throughout the world, and as competition enhances or depresses entire agglomerations, including milieux of innovation themselves. Also, secondary milieux of innovation are constituted, sometimes as decentralized systems spun off from primary centers, but they often find their niches in competition with their original matrices, examples to the point being Seattle *vis-à-vis* Silicon Valley and Boston in software, or Austin, Texas, *vis-à-vis* New York or Minneapolis in computers. Furthermore, in the 1990s, the development of the electronics industry in Asia, mainly under the impulse of American–Japanese competition, has complicated extraordinarily the geography of the industry in its mature stage, as shown in the analyses by Cohen and Borrus and by Dieter Ernst.[37] On the one hand, there has been substantial upgrading of the technological potential of American multinationals' subsidiaries, particularly in Singapore, Malaysia, and Taiwan, and this upgrading has trickled down to their local subsidiaries. On the other hand, Japanese electronics firms, as mentioned above, have massively decentralized their production in Asia, both to export globally and to supply their onshore parent plants. In both cases, a substantial supply base has been built in Asia, thus rendering obsolete the old spatial division of labor in which South-East and East Asian subsidiaries occupied the bottom level of the hierarchy.

Furthermore, on the basis of the review of available evidence up to 1994, including his own company surveys, Richard Gordon convincingly argues for the emergence of a new spatial division of labor, one characterized by its variable geometry, and its back and forth linkages between firms located in different territorial complexes, including the leading milieux of innovation. His detailed analysis of developments in 1990s' Silicon Valley shows the importance of extra-regional relationships for the most technologically sophisticated and transaction-intensive interactions of regional high-technology firms. Thus he argues that

36 Amin and Robins (1991).
37 Ernst (1994c); Cohen and Borrus (1995a).

> in this new global context, localized agglomeration, far from constituting an alternative to spatial dispersion, becomes the principal basis for participation in a global network of regional economies . . . Regions and networks in fact constitute interdependent poles within the new spatial mosaic of global innovation. Globalization in this context involves not the leavening impact of universal processes but, on the contrary, the calculated synthesis of cultural diversity in the form of differentiated regional innovation logics and capabilities.[38]

The new industrial space does not represent the demise of old, established metropolitan areas and the rising sun of new, high-tech regions. Nor can it be apprehended under the simplistic opposition between automation at the center and low-cost manufacturing at the periphery. It is organized in a hierarchy of innovation and fabrication articulated in global networks. But the direction and architecture of these networks are submitted to the endless changing movements of cooperation and competition between firms and between locales, sometimes historically cumulative, sometimes reversing the established pattern through deliberate institutional entrepreneurialism. What does remain as the characteristic logic of the new industrial location is its geographical discontinuity, paradoxically made up of territorial production complexes. The new industrial space is organized around flows of information that bring together and separate at the same time – depending upon cycles or firms – their territorial components. And as the logic of information technology manufacturing trickles down from the producers of information technology devices to the users of such devices in the whole realm of manufacturing, so the new spatial logic expands, creating a multiplicity of global industrial networks whose intersections and exclusions transform the very notion of industrial location from factory sites to manufacturing flows.

Everyday Life in the Electronic Cottage: the End of Cities?

The development of electronic communication and information systems allows for an increasing disassociation between spatial proximity and the performance of everyday life's functions: work, shopping, entertainment, healthcare, education, public services, governance, and the like. Accordingly, futurologists often predict the demise of the city, or at least of cities as we have known them until now, once they are

38 Gordon (1994: 46).

voided of their functional necessity. Processes of spatial transformation are of course much more complicated, as history shows. Therefore, it is worthwhile to consider the scant empirical record on the matter.[39]

A dramatic increase of teleworking is the most usual assumption about the impact of information technology on cities, and the last hope for metropolitan transportation planners before surrendering to the inevitability of the mega-gridlock. Yet, in 1988, a leading European researcher on telecommuting could write, without the shadow of a joke, that "There are more people doing research on telework than there are actual teleworkers."[40] In fact, as noted by Qvortup, the whole debate is biased by the lack of precision in defining telework, leading to considerable uncertainty when measuring the phenomenon.[41] After reviewing available evidence, he adequately distinguishes between three categories: (a) "Substitutors, those who substitute work done at home for work done in a traditional work setting" (these are telecommuters in the strict sense); (b) self-employed, working on-line from their homes; (c) supplementers, "bringing supplementary work home from their conventional office." Furthermore, in some cases this "supplementary work" takes most of the working time; for example, according to Kraut,[42] in the case of university professors. By most reliable accounts, the first category, telecommuters *stricto sensu* employed regularly to work on-line at home, is very small overall, and is not expected to grow substantially in the foreseeable future.[43] In the United States the highest estimates evaluated in 1991 about 5.5 million home-based telecommuters, but of this total only 16 percent telecommuted 35 hours or more per week, 25 percent telecommuted less than one day a week, with two days a week being the most common pattern. Thus, the percentage of workers who on any given day are telecommuting ranges, depending on estimates, between 1 and 2 percent of total labor force, with major metropolitan areas in California displaying the highest percentages.[44] On the other hand, what seems to be emerging is telecommuting from telecenters; that is, networked computer facilities scattered in the suburbs of metropolitan areas for workers to work on-line with their companies.[45] If these trends are confirmed, homes would not become workplaces, but work activity could spread con-

39 For sources on topics covered in this section, see Graham and Marvin (1996); Wheeler and Aoyama (2000).
40 Steinle (1988: 8).
41 Qvortup (1992: 8).
42 Kraut (1989).
43 Nilles (1988); Rijn and Williams (1988); Huws et al. (1990).
44 Mokhtarian (1991a, b); Handy and Mokhtarian (1995).
45 Mokhtarian (1991b).

siderably throughout the metropolitan area, increasing urban decentralization. Increase in home work may also result as a form of electronic outworking by temporary workers, paid by the piece of information processing under an individualized subcontracting arrangement.[46] Interestingly enough, in the United States, a 1991 national survey showed that fewer than a half of home telecommuters used computers: the rest worked with a telephone, pen, and paper.[47] Examples of such activities are social workers and welfare fraud investigators in Los Angeles County.[48] What is certainly significant, and on the rise, is the development of self-employment, and of "supplementers," either full-time or part-time, as part of the broader trend toward the disaggregation of labor and the formation of virtual business networks, as indicated in previous chapters. This does not imply the end of the office, but the diversification of working sites for a large fraction of the population, and particularly for its most dynamic, professional segment. Increasingly mobile telecomputing equipment will enhance this trend toward the office-on-the-run, in the most literal sense.[49]

How do these tendencies affect cities? Scattered data seem to indicate that transportation problems will get worse, not better, because increasing activity and time compression allowed by new networking organization translate into higher concentration of markets in certain areas, and into greater physical mobility for a labor force that was previously confined to its working sites during working hours.[50] Work-related commuting time is kept at a steady level in the US metropolitan areas, not because of improved technology, but because of a more decentralized location pattern of jobs and residences that allows easier, suburb-to-suburb traffic flows. In those cities, particularly in Europe, where a radioconcentric pattern still dominates daily commuting (such as Paris, Madrid, or Milan), commuting time is sharply up, particularly for stubborn automobile addicts.[51] As for the new, sprawling metropolises of Asia, their coming into the Information Age runs parallel to their discovery of the most awesome traffic jams in history, from Bangkok to Shanghai.[52]

Teleshopping was slow to live up to its promise, and ultimately was pushed out by the Internet's competition. It supplemented rather than replaced commercial areas.[53] However, e-commerce, with billions of

46 See Lozano (1989); Gurstein (1990).
47 "Telecommuting data form link resources corporation," cited by Mokhtarian (1991b).
48 Mokhtarian (1992:12).
49 "The New Face of Business," in *Business Week* (1994a: 99ff).
50 I have relied on a balanced evaluation of impacts by Vessali (1995).
51 Cervero (1989, 1991); Bendixon (1991).
52 Lo and Yeung (1996).
53 Miles (1988); Schoonmaker (1993); Menotti (1995).

dollars of on-line sales in the US over Christmas 1999, is a major, new development (see chapter 2). Nevertheless, the growing importance of on-line transactions does not imply the disappearance of shopping centers and retail stores. In fact, the trend is the opposite: shopping areas proliferate around the urban and suburban landscape, with showrooms that address customers to on-line ordering terminals to get the actual goods, often home-delivered.[54] A similar story can be told for most on-line consumer services. For instance, telebanking[55] is spreading fast, mainly under the impulse of banks interested in eliminating branch offices and replacing them by on-line customer services and automated-teller machines. However, the consolidated bank branches continue as service centers, to sell financial products to their customers through a personalized relationship. Even on-line, cultural features of localities may be important as locational factors for information-oriented transactions. Thus, First Direct, the telephone banking branch of Midland Bank in Britain, located in Leeds because its research "showed West Yorkshire's plain accent, with its flat vowel sounds but clear diction and apparent classlessness, to be the most easily understood and acceptable throughout the UK – a vital element of any telephone-based business."[56] Thus, it is the system of branch office sellers, automated tellers, customer service-by-telephone, and on-line transactions that constitutes the new banking industry.

Health services offer an even more interesting case of the emerging dialectics between concentration and centralization of people-oriented services. On the one hand, expert systems, on-line communications, and high-resolution video transmission allow for the distant interconnection of medical care. For instance, in a practice that has become usual, if not yet routine, in 1995, highly skilled surgeons supervise by videoconference surgery performed at the other end of the country or of the world, literally guiding the less-expert hand of another surgeon into a human body. Regular health checks are also conducted via computer and telephone on the basis of patients' computerized, updated information. Neighborhood healthcare centers are backed by information systems to improve the quality and efficiency of their primary-level attention. Yet, on the other hand, in most countries major medical complexes emerge in specific locales, generally in large metropolitan areas. Usually organized around a big hospital, often connected to medical and nursing schools, they include in their physical proximity private clinics headed by the most prominent hospital doctors,

54 *Business Week* (1999d).
55 Castano (1991); Silverstone (1991).
56 Fazy (1995).

radiology centers, test laboratories, specialized pharmacists, and, not infrequently, gift shops and mortuaries, to cater for the whole range of possibilities. Indeed, such medical complexes are a major economic and cultural force in the areas and cities where they are located, and tend to expand in their surrounding vicinity over time. When forced to relocate, the whole complex moves together.[57]

Schools and universities are paradoxically the institutions least affected by the virtual logic embedded in information technology, in spite of the foreseeable quasi-universal use of computers in the classrooms of advanced countries. But they will hardly vanish into virtual space. In the case of elementary and secondary schools, this is because they are as much childcare centers and/or children's warehouses as they are learning institutions. In the case of universities, this is because the quality of education is still, and will be for a long time, associated with the intensity of face-to-face interaction. Thus, the large-scale experiences of "distant universities," regardless of their quality (bad in Spain, good in Britain), seem to show that they are second-option forms of education which could play a significant role in a future, enhanced system of adult education, but which could hardly replace current higher-education institutions. What is emerging, however, in good-quality universities is the combination of on-line, distant learning and on-site education. This means that the future higher-education system will not be on-line, but on networks between nodes of information, classrooms' sites, and students' individual locations. Computer-mediated communication is diffusing around the world, although with an extremely uneven geography, as mentioned in chapter 5. Thus, some segments of societies across the globe, for the time being concentrated in the upper professional strata, interact with each other, reinforcing the social dimension of the space of flows.[58]

There is no point in exhausting the list of empirical illustrations of the actual impacts of information technology on the spatial dimension of everyday life. What emerges from different observations is a similar picture of simultaneous spatial dispersion and concentration via information technologies. People increasingly work and manage services from their home, as the 1993 survey of the European Foundation for the Improvement of Living and Working Conditions shows.[59] Thus, "home centeredness" is an important trend of the new society. Yet it does not mean the end of the city. Because workplaces, schools, medi-

57 Moran (1990); Lincoln et al. (1993); Miller and Swensson (1995).
58 Batty and Barr (1994); Graham and Marvin (1996); Wellman (1999).
59 Moran (1993).

cal complexes, consumer services outlets, recreational areas, commercial streets, shopping centers, sports stadiums, and parks still exist and will exist, and people will shuttle between all these places with increasing mobility precisely because of the newly acquired looseness of working arrangements and social networking: as time becomes more flexible, places become more singular, as people circulate among them in an increasingly mobile pattern.

However, the interaction between new information technology and current processes of social change does have a substantial impact on cities and space. On the one hand, the urban form is considerably transformed in its layout. But this transformation does not follow a single, universal pattern: it shows considerable variation depending upon the characteristics of historical, territorial, and institutional contexts. On the other hand, the emphasis on interactivity between places breaks up spatial patterns of behavior into a fluid network of exchanges that underlies the emergence of a new kind of space, the space of flows. On both counts, I must tighten the analysis and raise it to a more theoretical level.

The Transformation of Urban Form: the Informational City

The Information Age is ushering in a new urban form, the informational city. Yet, as the industrial city was not a worldwide replica of Manchester, the emerging informational city will not copy Silicon Valley, let alone Los Angeles. On the other hand, as in the industrial era, in spite of the extraordinary diversity of cultural and physical contexts there are some fundamental common features in the transcultural development of the informational city. I shall argue that, because of the nature of the new society, based upon knowledge, organized around networks, and partly made up of flows, the informational city is not a form but a process, a process characterized by the structural domination of the space of flows. Before developing this idea, I think it is first necessary to introduce the diversity of emerging urban forms in the new historical period, to counter a primitive technological vision that sees the world through the simplified lenses of endless freeways and fiber-optic networks.

America's last suburban frontier

The image of a homogeneous, endless suburban/ex-urban sprawl as the city of the future is belied even by its unwilling model, Los

Angeles, whose contradictory complexity is revealed by Mike Davis's marvelous *City of Quartz*.[60] Yet it does evoke a powerful trend in the relentless waves of suburban development in the American metropolis, West and South as well as North and East, toward the end of the millennium. Joel Garreau has captured the similarities of this spatial model across America in his journalistic account of the rise of *Edge City*, as the core of the new urbanization process. He empirically defines Edge City by the combination of five criteria:

> Edge City is any place that: (a) Has five million square feet or more of leasable office space – the work place of the Information Age . . . (b) Has 600,000 square feet or more of leasable retail space . . . (c) Has more jobs than bedrooms (d) Is perceived by the population as one place . . . (e) Was nothing like 'city' as recently as thirty years ago.[61]

He reports the mushrooming of such places around Boston, New Jersey, Detroit, Atlanta, Phoenix, Texas, southern California, San Francisco Bay area, and Washington, DC. They are both working areas and service centers around which mile after mile of increasingly dense, single-family dwelling residential units organize the "home centeredness" of private life. He remarks that these ex-urban constellations are:

> tied together not by locomotives and subways, but by freeways, jetways, and rooftop satellite dishes thirty feet across. Their characteristic monument is not a horse-mounted hero, but the atria reaching for the sun and shielding trees perpetually in leaf at the core of corporate headquarters, fitness centers, and shopping plazas. These new urban areas are marked not by the penthouses of the old urban rich or the tenements of the old urban poor. Instead, their landmark structure is the celebrated single-family detached dwelling, the suburban home with grass all around that made America the best housed civilization the world has ever known.[62]

Naturally, where Garreau sees the relentless frontier spirit of American culture, always creating new forms of life and space, James Howard Kunstler sees the regrettable domination of the "geography of nowhere,"[63] thus reigniting a decades-long debate between partisans and detractors of America's sharp spatial departure from its European ancestry. Yet, for the purpose of my analysis, I will retain just two major points of this debate.

60 Davis (1990).
61 Garreau (1991: 6–7).
62 Garreau (1991: 4).
63 Kunstler (1993).

First, the development of these loosely interrelated ex-urban constellations emphasizes the functional interdependence of different units and processes in a given urban system over very long distances, minimizing the role of territorial contiguity, and maximizing the communication networks in all their dimensions. Flows of exchange are at the core of the American Edge City.[64]

Secondly, this spatial form is indeed very specific to the American experience because, as Garreau acknowledges, it is embedded in a classic pattern of American history, always pushing for the endless search for a promised land in new settlements. While the extraordinary dynamism that this represents did indeed build one of the most vital nations in history, it did so at the price of creating, over time, staggering social and environmental problems. Each wave of social and physical escapism (for example, the abandonment of inner cities, leaving the lower social classes and ethnic minorities trapped in their ruins) deepened the crisis of American cities,[65] and made more difficult the management of an overextended infrastructure and of an overstressed society. Unless the development of private "jails-for-rent" in Western Texas is considered a welcome process to complement the social and physical disinvestment in American inner cities, the "*fuite en avant*" of American culture and space seems to have reached the limits of refusing to face unpleasant realities. Thus, the profile of America's informational city is not fully represented by the Edge City phenomenon, but by the relationship between fast ex-urban development, inner-city decay, and obsolescence of the suburban built environment.[66]

European cities have entered the Information Age along a different line of spatial restructuring linked to their historical heritage, although finding new issues, not always dissimilar to those emerging in the American context.

The fading charm of European cities

A number of trends constitute together the new urban dynamics of major European metropolitan areas in the 1990s.[67] The business center is, as in America, the economic engine of the city, networked in the global economy. The business center is made up of an infrastructure of telecommunications, communications, advanced services, and office space, based upon technology-generating centers and educational

64 See the collection of papers gathered in Caves (1994).
65 Goldsmith and Blakely (1992).
66 Gottdiener (1985); Fainstein et al. (1992).
67 For developments on European cities, see Borja et al. (1991); Deben et al. (1993); Martinotti (1993); Siino (1994); Hall (1995); Borja and Castells (1997).

institutions. It thrives upon information processing and control functions. It is usually complemented by tourism and travel facilities. It is a node of the inter-metropolitan network.[68] Thus, the business center does not exist by itself but by its connection to other equivalent locales organized in a network that forms the actual unit of management, innovation, and work.[69]

The new managerial–technocratic–political elite does create exclusive spaces, as segregated and removed from the city at large as the bourgeois quarters of the industrial society, but, because the professional class is larger, on a much larger scale. In most European cities (Paris, Rome, Madrid, Amsterdam), unlike in America – if we except New York, the most un-American of US cities – the truly exclusive residential areas tend to appropriate urban culture and history, by locating in rehabilitated or well-preserved areas of the central city. By so doing, they emphasize the fact that when domination is clearly established and enforced (unlike in *nouveau-riche* America) the elite does not need to go into suburban exile to escape the populace. This trend is, however, limited in the case of the UK where the nostalgia for the life of the gentry in the countryside translates into up-scale residence in selected suburbs of metropolitan areas, sometimes urbanizing charming historic villages in the vicinity of a major city.

The suburban world of European cities is a socially diversified space; that is, segmented in different peripheries around the central city. There are the traditional working-class suburbs, often organized around large, public housing estates, lately in home ownership. There are the new towns, French, British, or Swedish, inhabited by a younger population of the middle classes, whose age made it difficult for them to penetrate the housing market of the central city. And there are also the peripheral ghettos of older public housing estates, exemplified by Paris's La Courneuve, where new immigrant populations and poor working families experience exclusion from their "right to the city." Suburbs are also the locus of manufacturing production in European cities, both for traditional manufacturing and for new, high-technology industries that locate in the newest and environmentally most desirable peripheries of metropolitan areas, close enough to the communication centers but removed from old industrial districts.

Central cities are still shaped by their history. Thus, traditional working-class neighborhoods, increasingly populated by service workers, constitute a distinctive space, a space that, because it is the most vulnerable, becomes the battleground between the redevelopment efforts

68 Dunford and Kafkalas (1992); Robson (1992).
69 Tarr and Dupuy (1988).

of business and the upper middle class, and the invasion attempts of countercultures (Amsterdam, Copenhagen, Berlin) trying to reappropriate the use value of the city. Thus, they often become defensive spaces for workers who only have their home to fight for, being at the same time meaningful popular neighborhoods and likely bastions of xenophobia and localism.

The new professional middle class in Europe is torn between attraction to the peaceful comfort of boring suburbs and the excitement of a hectic, and often too expensive, urban life. The trade-offs between the differential spatial patterns of work of dual-job families often determine the location of their household.

The central city, in Europe as well, is also the focus for the ghettos of immigrants. However, unlike American ghettos, most of these areas are not so economically deprived because immigrant residents are generally workers, with strong family ties, thus counting on a very strong support structure that makes European ghettos family-oriented communities, unlikely to be taken over by street crime. England again seems exceptional in this regard, with some ethnic-minority neighborhoods in London (for example, Tower Hamlets or Hackney) being closer to the American experience than to Paris's La Goutte d'Or. Paradoxically, it is in the core administrative and entertainment districts of European cities, be it Frankfurt or Barcelona, where urban marginality makes its presence felt. Its pervasive occupation of the busieststreets and public transportation nodal points is a survival strategy destined to be present, so that they can receive public attention or private business, whether it be welfare assistance, a drug transaction, a prostitution deal, or the customary police attention.

Major European metropolitan centers present some variation around the urban structure I have outlined, depending upon their differential role in the European network of cities. The lower their position in the new informational network, the greater the difficulty of their transition from the industrial stage, and the more traditional will be their urban structure, with old-established neighborhoods and commercial quarters playing the determinant role in the dynamics of the city. On the other hand, the higher their position in the competitive structure of the new European economy, the greater the role of their advanced services in the business district, and the more intense will be the restructuring of urban space.

The critical factor in the new urban processes, in Europe as elsewhere, is the fact that urban space is increasingly differentiated in social terms, while being functionally interrelated beyond physical contiguity. There follows the separation between symbolic meaning, location of functions, and the social appropriation of space in the

metropolitan area. This is the trend underlying the most important transformation of urban forms worldwide, with particular force in the newly industrializing areas: the rise of mega-cities.

Third millennium urbanization: mega-cities

The new global economy and the emerging informational society have indeed a new spatial form, which develops in a variety of social and geographical contexts: mega-cities.[70] Mega-cities are, certainly, very large agglomerations of human beings, all of them (13 in the United Nations classification) with over 10 million people in 1992 (see figure 6.4), and four of them projected to be well over 20 million in 2010. But size is not their defining quality. They are the nodes of the global economy, concentrating the directional, productive, and managerial upper functions all over the planet: the control of the media; the real politics of power; and the symbolic capacity to create and diffuse messages. They have names, most of them alien to the still dominant European/North American cultural matrix: Tokyo, São Paulo, New York, Ciudad de Mexico, Shanghai, Bombay, Los Angeles, Buenos Aires, Seoul, Beijing, Rio de Janeiro, Calcutta, Osaka. In addition, Moscow, Jakarta, Cairo, New Delhi, London, Paris, Lagos, Dacca, Karachi, Tianjin, and possibly others, are in fact members of the club.[71] Not all of them (for example, Dacca or Lagos) are dominant centers of the global economy, but they do connect to this global system huge segments of the human population. They also function as magnets for their hinterlands; that is, the whole country or regional area where they are located. Mega-cities cannot be seen only in terms of their size, but as a function of their gravitational power toward major regions of the world. Thus, Hong Kong is not just its six million people, and Guangzhou is not just its six and a half million people: what is emerging is a mega-city of 40–50 million people, connecting Hong Kong, Shenzhen, Guangzhou, Zhuhai, Macau, and small towns in the Pearl River Delta, as I shall develop below. Mega-cities articulate the global economy, link up the informational networks, and concentrate the world's power. But they are also the depositories of all these segments of the population who fight to survive, as well as of those groups who want to make visible their dereliction, so that they will not die ignored in areas bypassed by communication networks. Mega-cities concen-

70 The notion of mega-cities has been popularized by several urban experts in the international arena, most notably by Janice Perlman, founder and director of the New York-based "Mega-cities Project." For a journalistic account of her vision, see *Time* (1993), which also offers basic data on the topic.

71 See Borja and Castells (1997).

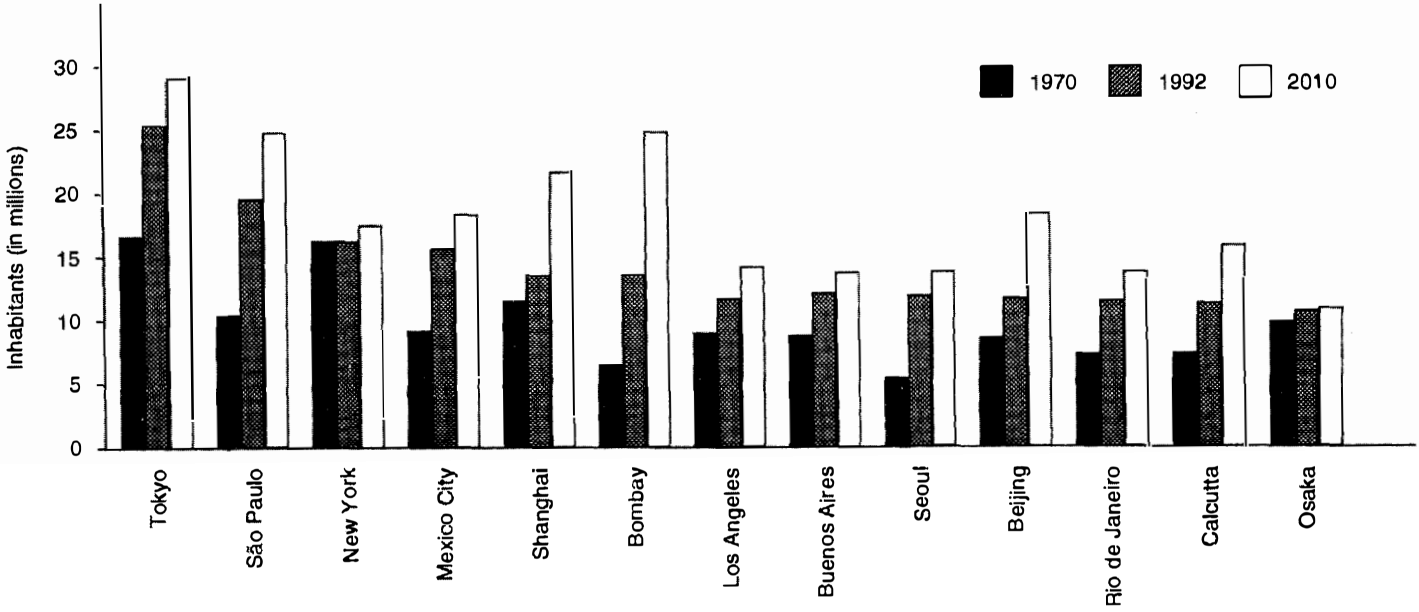

Figure 6.4 The world's largest urban agglomerations (> 10 million inhabitants in 1992)
Source: United Nations (1992)

trate the best and the worst, from the innovators and the powers that be to their structurally irrelevant people, ready to sell their irrelevance or to make "the others" pay for it. Yet what is most significant about mega-cities is that they are connected externally to global networks and to segments of their own countries, while internally disconnecting local populations that are either functionally unnecessary or socially disruptive. I argue that this is true of New York as well as of Mexico or Jakarta. *It is this distinctive feature of being globally connected and locally disconnected, physically and socially, that makes mega-cities a new urban form.* A form that is characterized by the functional linkages it establishes across vast expanses of territory, yet with a great deal of discontinuity in land-use patterns. Mega-cities' functional and social hierarchies are spatially blurred and mixed, organized in retrenched encampments, and unevenly patched by unexpected pockets of undesirable uses. Mega-cities are discontinuous constellations of spatial fragments, functional pieces, and social segments.[72]

To illustrate my analysis I shall refer to a mega-city in the making that is not even yet on the map but that, in my opinion, will be one of the pre-eminent industrial, business, and cultural centers of the twenty-first century, without indulging in futurology: the Hong Kong–Shenzhen–Canton–Pearl River Delta–Macau–Zhuhai metropolitan regional system.[73] Let us look at the mega-urban future from this vantage point (see figure 6.5). In 1995, this spatial system, still without a name, extended itself over 50,000 km^2, with a total population of between 40 and 50 million, depending on where boundaries are defined. Its units, scattered in a predominantly rural landscape, were functionally connected on a daily basis, and communicated through a multimodal transportation system that included railways, freeways, country roads, hovercrafts, boats, and planes. New superhighways were under construction, and the railway was being fully electrified and double-tracked. An optic fiber telecommunications system was in process of connecting the whole area internally and with the world, mainly via earth stations and cellular telephony. Five new airports were under construction in Hong Kong, Macau, Shenzhen, Zhuhai, and Guangzhou, with a projected passenger traffic capacity of 150 million per year. New container ports were also being built in North Lantau (Hong Kong), Yiantian (Shenzhen), Gaolan (Zhuhai), Huangpo

72 Mollenkopf and Castells (1991); Lo and Yeung (1996).

73 My analysis on the emerging southern China metropolis is based, on the one hand, on my personal knowledge of the area, particularly of Hong Kong and Shenzhen, where I conducted research in the 1980s; on the other hand, particularly for developments in the 1990s, on a number of sources of which the most relevant are the following: Sit (1991); Leung (1993); Lo (1994); Hsing (1995); Kwok and So (1995); Ling (1995).

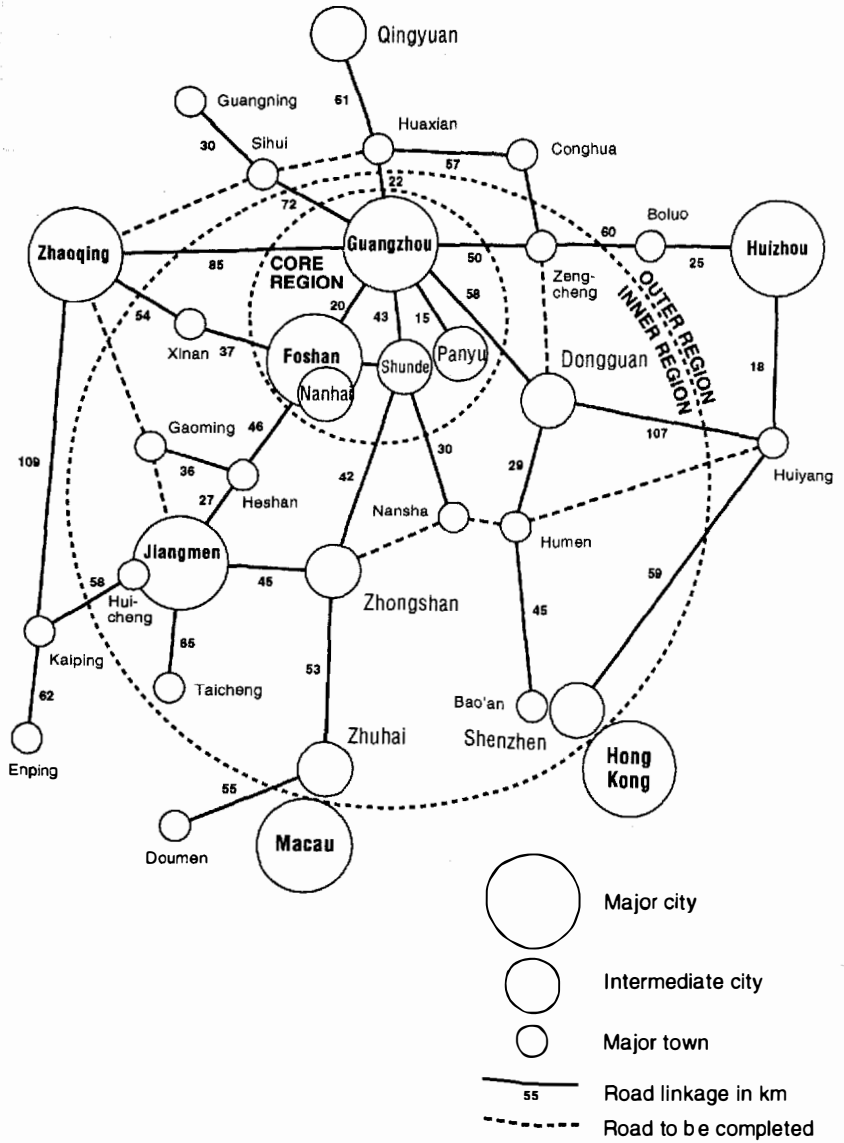

Figure 6.5 Diagrammatic representation of major nodes and links in the urban region of the Pearl River Delta
Source: Woo (1994)

(Guangzhou) and Macau, adding up to the world's largest port capacity in a given location. At the heart of such staggering metropolitan development are three interlinked phenomena:

1 The economic transformation of China, and its link-up to the global economy, with Hong Kong being one of the nodal points in such connection. Thus, in 1981–91, Guandong province's GDP grew at 12.8 percent per year in real terms. Hong Kong-based investors accounted at the end of 1993 for US$40 billion invested in China, representing two-thirds of total foreign direct investment. At the same time, China was also the largest foreign investor in Hong Kong, with about US$25 billion a year (compared with Japan's US$12.7 billion). The management of these capital flows was dependent upon the business transactions operated in, and in between, the various units of this metropolitan system. Thus, Guanghzou was the actual connecting point between Hong Kong business and the governments and enterprises not only of Guandong province, but of inland China.
2 The restructuring of Hong Kong's economic basis in the 1990s led to a dramatic shrinkage of Hong Kong's traditional manufacturing basis, to be replaced by employment in advanced services. Thus, manufacturing workers in Hong Kong decreased from 837,000 in 1988 to 484,000 in 1993, while employees in trading and business sectors increased, in the same period, from 947,000 to 1.3 million. Hong Kong developed its functions as a global business center.
3 However, Hong Kong's manufacturing exports capacity did not fade away: it simply modified its industrial organization and its spatial location. In about ten years, between the mid-1980s and the mid-1990s, Hong Kong's industrialists induced one of the largest-scale processes of industrialization in human history in the small towns of the Pearl River Delta. By the end of 1994, Hong Kong investors, often using family and village connections, had established in the Pearl River Delta 10,000 joint ventures and 20,000 processing factories, in which were working about 6 million workers, depending upon various estimates. Much of this population, housed in company dormitories in semi-rural locations, came from surrounding provinces beyond the borders of Guandong. This gigantic industrial system was being managed on a daily basis from a multilayered managerial structure, based in Hong Kong, regularly traveling to Guangzhou, with production runs being supervised by local managers throughout the rural area. Materials, technology, and managers were being sent from Hong Kong and Shenzhen, and manufactured goods were generally exported from

Hong Kong (actually surpassing the value of Hong Kong-made exports), although the building of new container ports in Yiantian and Gaolan aimed at diversifying export sites.

This accelerated process of export-oriented industrialization and business linkages between China and the global economy led to an unprecedented urban explosion. Shenzhen Special Economic Zone, on the Hong Kong border, grew from zero to 1.5 million inhabitants between 1982 and 1995. Local governments in the whole area, full of cash from overseas Chinese investors, embarked on the construction of major infrastructural projects, the most amazing of which, still in the planning stage at the time of writing, was the decision by Zhuhai's local government to build a 60 km bridge over the South China Sea to link by road Zhuhai and Hong Kong.

The southern China metropolis, still in the making but a sure reality, is a new spatial form. It is not the traditional megalopolis identified by Gottman in the 1960s on the north-eastern seaboard of the United States. Unlike this classical case, the Hong Kong–Guandong metropolitan region is not made up of the physical conurbation of successive urban/suburban units with relative functional autonomy in each one of them. It is rapidly becoming an interdependent unit, economically, functionally, and socially, even more so after Hong Kong and Macau rejoined China. But there is considerable spatial discontinuity within the area, with rural settlements, agricultural land, and undeveloped areas separating urban centers, and industrial factories being scattered all over the region. The internal linkages of the area and the indispensable connection of the whole system to the global economy via multiple communication links are the real backbone of this new spatial unit. Flows define the spatial form and processes. Within each city, within each area, processes of segregation and segmentation take place, in a pattern of endless variation. But such segmented diversity is dependent upon a functional unity marked by gigantic, technology-intensive infrastructures, which seem to know as their only limit the amount of fresh water that the region can still retrieve from the East River area. The southern China metropolis, only vaguely perceived in most of the world at this time, is likely to become the most representative urban face of the twenty-first century.

Current trends point in the direction of another Asian mega-city on an even greater scale when, in the early twenty-first century, the corridor Tokyo–Yokohama–Nagoya (already a functional unit) links up with Osaka–Kobe–Kyoto, creating the largest metropolitan agglomeration in human history, not only in terms of population, but in economic and technological power. Thus, in spite of all their social, urban and

environmental problems, mega-cities will continue to grow, both in their size and in their attractiveness for the location of high-level functions and for people's choice. The ecological dream of small, quasi-rural communes will be pushed away to countercultural marginality by the historical tide of mega-city development. This is because mega-cities are:

- centers of economic, technological, and social dynamism, in their countries and on a global scale; they are the actual development engines; their countries' economic fate, be it the United States or China, depends on mega-cities' performance, in spite of the small-town ideology still pervasive in both countries;
- centers of cultural and political innovation;
- connecting points to the global networks of every kind; the Internet cannot bypass mega-cities: it depends on the telecommunications and on the "telecommunicators" located in those centers.

To be sure, some factors will slow down their pace of growth, depending on the accuracy and effectiveness of policies designed to limit mega-cities' growth. Family planning is working, in spite of the Vatican, so we can expect a continuation of the decline in the birthrate already taking place. Policies of regional development may be able to diversify the concentration of jobs and population to other areas. And I foresee large-scale epidemics, and disintegration of social control that will make mega-cities less attractive. However, overall, mega-cities will grow in size and dominance, because they keep feeding themselves on population, wealth, power, and innovators, from their extended hinterland. Furthermore, they are the nodal points connecting to the global networks. Thus, in a fundamental sense, the future of humankind, and of each mega-city's country, is being played out in the evolution and management of these areas. Mega-cities are the nodal points, and the power centers of the new spatial form/process of the Information Age: the space of flows.

Having laid out the empirical landscape of new territorial phenomena, we now have to come to grips with the understanding of such a new spatial reality. This requires an unavoidable excursus through the uncertain trails of the theory of space.

The Social Theory of Space and the Theory of the Space of Flows

Space is the expression of society. Since our societies are undergoing structural transformation, it is a reasonable hypothesis to suggest that

new spatial forms and processes are currently emerging. The purpose of the analysis presented here is to identify the new logic underlying such forms and processes.

The task is not an easy one because the apparently simple acknowledgement of a meaningful relationship between society and space hides a fundamental complexity. This is because space is not a reflection of society, it is its expression. In other words: space is not a photocopy of society, it is society. Spatial forms and processes are formed by the dynamics of the overall social structure. This includes contradictory trends derived from conflicts and strategies between social actors playing out their opposing interests and values. Furthermore, social processes influence space by acting on the built environment inherited from previous socio-spatial structures. Indeed, *space is crystallized time.* To approach in the simplest possible terms such a complexity, let us proceed step by step.

What is space? In physics, it cannot be defined outside the dynamics of matter. In social theory, it cannot be defined without reference to social practices. This area of theorizing being one of my old trades, I still approach the issue under the assumption that "space is a material product, in relationship to other material products – including people – who engage in [historically] determined social relationships that provide space with a form, a function, and a social meaning."[74] In a convergent and clearer formulation, David Harvey, in his book *The Condition of Postmodernity,* states that "from a materialist perspective, we can argue that objective conceptions of time and space are necessarily created through material practices and processes which serve to reproduce social life . . . It is a fundamental axiom of my enquiry that time and space cannot be understood independently of social action."[75] Thus, we have to define, at a general level, what space is, from the point of view of social practices; then, we must identify the historical specificity of social practices, for example those in the informational society that underlie the emergence and consolidation of new spatial forms and processes.

From the point of view of social theory, *space is the material support of time-sharing social practices.* I immediately add that any material support bears always a symbolic meaning. By time-sharing social practices I refer to the fact that space brings together those practices that are simultaneous in time. It is the material articulation of this simultaneity that gives sense to space *vis-à-vis* society. Traditionally, this notion was assimilated to contiguity. Yet it is fundamental that

74 Castells (1972: 152) (my own translation).
75 Harvey (1990: 204).

we separate the basic concept of material support of simultaneous practices from the notion of contiguity, in order to account for the possible existence of material supports of simultaneity that do not rely on physical contiguity, since this is precisely the case of the dominant social practices of the Information Age.

I have argued in the preceding chapters that our society is constructed around flows: flows of capital, flows of information, flows of technology, flows of organizational interaction, flows of images, sounds, and symbols. Flows are not just one element of the social organization: they are the expression of processes *dominating* our economic, political, and symbolic life. If such is the case, the material support of the dominant processes in our societies will be the ensemble of elements supporting such flows, and making materially possible their articulation in simultaneous time. Thus, I propose the idea that there is a new spatial form characteristic of social practices that dominate and shape the network society: the space of flows. *The space of flows is the material organization of time-sharing social practices that work through flows.* By flows I understand purposeful, repetitive, programmable sequences of exchange and interaction between physically disjointed positions held by social actors in the economic, political, and symbolic structures of society. Dominant social practices are those which are embedded in dominant social structures. By dominant structures I understand those arrangements of organizations and institutions whose internal logic plays a strategic role in shaping social practices and social consciousness for society at large.

The abstraction of the concept of the space of flows can be better understood by specifying its content. The space of flows, as the material form of support of dominant processes and functions in the informational society, can be described (rather than defined) by the combination of at least three layers of material supports that, together, constitute the space of flows. *The first layer, the first material support of the space of flows, is actually constituted by a circuit of electronic exchanges* (micro-electronics-based devices, telecommunications, computer processing, broadcasting systems, and high-speed transportation – also based on information technologies) that, together, form the material basis for the processes we have observed as being strategically crucial in the network of society. This is indeed a material support of simultaneous practices. Thus, it is a spatial form, just as it could be "the city" or "the region" in the organization of the merchant society or of the industrial society. The spatial articulation of dominant functions does take place in our societies in the network of interactions made possible by information technology devices. In this network, no place exists by itself, since the positions are defined by

the exchanges of flows in the network. Thus, the network of communication is the fundamental spatial configuration: places do not disappear, buttheir logic and their meaning become absorbed in the network. The technological infrastructure that builds up the network defines the new space, very much like railways defined "economic regions" and "national markets" in the industrial economy; or the boundary-specific, institutional rules of citizenry (and their technologically advanced armies) defined "cities" in the merchant origins of capitalism and democracy. This technological infrastructure is itself the expression of the network of flows whose architecture and content is determined by the powers that be in our world.

The second layer of the space of flows is constituted by its nodes and hubs. The space of flows is not placeless, although its structural logic is. It is based on an electronic network, but this network links up specific places, with well-defined social, cultural, physical, and functional characteristics. Some places are exchangers, communication hubs playing a role of coordination for the smooth interaction of all the elements integrated into the network. Other places are the nodes of the network; that is, the location of strategically important functions that build a series of locality-based activities and organizations around a key function in the network. Location in the node links up the locality with the whole network. Both nodes and hubs are hierarchically organized according to their relative weight in the network. But this hierarchy may change depending upon the evolution of activities processed through the network. Indeed, in some instances, some places may be switched off the network, their disconnection resulting in instant decline, and thus in economic, social and physical deterioration. The characteristics of nodes are dependent upon the type of functions performed by a given network.

Some examples of networks, and their corresponding nodes, will help to communicate the concept. The easiest type of network to visualize as representative of the space of flows is the network constituted by decision-making systems of the global economy, particularly those relative to the financial system. This refers to the analysis of the global city as a process rather than a place, as presented in this chapter. The analysis of the "global city" as the production site of the informational, global economy has shown the critical role of these global cities in our societies, and the dependence of local societies and economies upon the directional functions located in such cities. But beyond the main global cities, other continental, national, and regional economies have their own nodes that connect to the global network. Each one of these nodes requires an adequate technological infrastructure, a system of ancillary firms providing the support services, a specialized labor

market, and the system of services required by the professional labor force.

As I showed above, what is true for top managerial functions and financial markets is also applicable to high-technology manufacturing (both to industries producing high technology and to those using high technology, that is all advanced manufacturing). The spatial division of labor that characterizes high-technology manufacturing translates into the worldwide connection between the milieux of innovation, the skilled manufacturing sites, the assembly lines, and the market-oriented factories, with a series of intra-firm linkages between the different operations in different locations along the production lines; and another series of inter-firm linkages among similar functions of production located in specific sites that become production complexes. Directional nodes, production sites, and communication hubs are defined along the network and articulated in a common logic by communication technologies and programmable, micro-electronics-based, flexible integrated manufacturing.

The functions to be fulfilled by each network define the characteristics of places that become their privileged nodes. In some cases, the most unlikely sites become central nodes because of historical specificity that ends up centering a given network around a particular locality. For instance, it was unlikely that Rochester, Minnesota, or the Parisian suburb of Villejuif would become central nodes of a world network of advanced medical treatment and health research, in close interaction with each other. But the location of the Mayo Clinic at Rochester and of one of the main centers for cancer treatment of the French health administration at Villejuif, in both cases for accidental, historical reasons, have articulated a complex of knowledge generation and advanced medical treatment around these two odd locales. Once established, they attracted researchers, doctors, and patients from around the world: they became a node in the world's medical network.

Each network defines its sites according to the functions and hierarchy of each site, and to the characteristics of the product or service to be processed in the network. Thus, one of the most powerful networks in our society, narcotics production and distribution (including its money-laundering component), has constructed a specific geography that has redefined the meaning, structure, and culture of societies, regions, and cities connected in the network.[76] Thus, in cocaine production and trade, the coca production sites of Chapare or Alto Beni in Bolivia or Alto Huallanga in Peru are connected to the refiner-

76 Arrieta et al. (1991); Laserna (1995).

ies and management centers in Colombia, which were subsidiary, until 1995, to the Medellin or Cali headquarters, themselves connected to financial centers such as Miami, Panama, the Cayman Islands, and Luxembourg, and to transportation centers, such as the Tamaulipas or Tijuana drug traffic networks in Mexico, then finally to distribution points in the main metropolitan areas of America and Western Europe. None of these localities can exist by itself in such a network. The Medellin and Cali cartels, and their close American and Italian allies, would have been out of business a long time before being dismantled by repression without the raw materials produced in Bolivia or Peru, without the chemicals (precursors) provided by Swiss and German laboratories, without the semi-legal financial networks of free-banking paradises, and without the distribution networks starting in Miami, Los Angeles, New York, Amsterdam, or La Coruña.

Therefore, while the analysis of global cities provides the most direct illustration of the place-based orientation of the space of flows in nodes and hubs, this logic is not limited by any means to capital flows. The main dominant processes in our society are articulated in networks that link up different places and assign to each one of them a role and a weight in a hierarchy of wealth generation, information processing, and power making that ultimately conditions the fate of each locale.

The third important layer of the space of flows refers to the spatial organization of the dominant, managerial elites (rather than classes) that exercise the directional functions around which such space is articulated. The theory of the space of flows starts from the implicit assumption that societies are asymmetrically organized around the dominant interests specific to each social structure. The space of flows is not the only spatial logic of our societies. It is, however, the dominant spatial logic because it is the spatial logic of the dominant interests/functions in our society. But such domination is not purely structural. It is enacted, indeed conceived, decided, and implemented by social actors. Thus, the technocratic–financial–managerial elite that occupies the leading positions in our societies will also have specific spatial requirements regarding the material/spatial support of their interests and practices. The spatial manifestation of the informational elite constitutes another fundamental dimension of the space of flows. What is this spatial manifestation?

The fundamental form of domination in our society is based on the organizational capacity of the dominant elite that goes hand in hand with its capacity to disorganize those groups in society which, while constituting a numerical majority, see their interests partially (if ever) represented only within the framework of the fulfillment of the domi-

nant interests. Articulation of the elites, segmentation and disorganization of the masses seem to be the twin mechanisms of social domination in our societies.[77] Space plays a fundamental role in this mechanism. In short: elites are cosmopolitan, people are local. The space of power and wealth is projected throughout the world, while people's life and experience is rooted in places, in their culture, in their history. Thus, the more a social organization is based upon ahistorical flows, superseding the logic of any specific place, the more the logic of global power escapes the socio-political control of historically specific local/national societies.

On the other hand, the elites do not want and cannot become flows themselves, if they are to preserve their social cohesion, develop the set of rules and the cultural codes by which they can understand each other and dominate the others, thus establishing the "in" and "out" boundaries of their cultural/political community. The more a society is democratic in its institutions, the more the elites have to become clearly distinct from the populace, so avoiding the excessive penetration of political representatives into the inner world of strategic decision-making. However, my analysis does not share the hypothesis about the improbable existence of a "power elite" *à la* Wright Mills. On the contrary, the real social domination stems from the fact that cultural codes are embedded in the social structure in such a way that the possession of these codes opens the access to the power structure without the elite needing to conspire to bar access to its networks.

The spatial manifestation of this logic of domination takes two main forms in the space of flows. On the one hand, the elites form their own society, and constitute symbolically secluded communities, retrenched behind the very material barrier of real-estate pricing. They define their community as a spatially bound, interpersonally networked subculture. I propose the hypothesis that the space of flows is made up of personal micro-networks that project their interests in functional macro-networks throughout the global set of interactions in the space of flows. This is a well-known phenomenon in the financial networks: major strategic decisions are taken over business luncheons in exclusive restaurants, or in country house week-ends over golf playing, as in the good old days. But such decisions will be executed in instant decision-making processes over telecommunicated computers which can trigger their own decisions to react to market trends. Thus, the nodes of the space of flows include residential and leisure-oriented spaces which, along with the location of headquarters and their ancillary services, tend to cluster dominant functions in carefully segregated spaces, with

77 See Zukin (1992).

easy access to cosmopolitan complexes of arts, culture, and entertainment. Segregation happens both by location in different places and by security control of certain spaces open only to the elite. From the pinnacles of power and their cultural centers, a series of symbolic socio-spatial hierarchies is organized, so that lower levels of management can mirror the symbols of power and appropriate such symbols by constructing second-order spatial communities that will also tend to isolate themselves from the rest of society, in a succession of hierarchical segregation processes that, together, are tantamount to socio-spatial fragmentation. At the limit, when social tensions rise, and cities decay, elites take refuge behind the walls of "gated communities," a major phenomenon around the world in the late 1990s, from southern California to Cairo and from São Paulo to Bogota.[78]

A second major trend of cultural distinctiveness of the elites in the informational society is to create a lifestyle and to design spatial forms aimed at unifying the symbolic environment of the elite around the world, thus superseding the historical specificity of each locale. Thus, there is the construction of a (relatively) secluded space across the world along the connecting lines of the space of flows: international hotels whose decoration, from the design of the room to the color of the towels, is similar all over the world to create a sense of familiarity with the inner world, while inducing abstraction from the surrounding world; airports' VIP lounges, designed to maintain distance *vis-à-vis* society in the highways of the space of flows; mobile, personal, on-line access to telecommunications networks, so that the traveler is never lost; and a system of travel arrangements, secretarial services, and reciprocal hosting that maintains a close circle of the corporate elite together through the worshipping of similar rites in all countries. Furthermore, there is an increasingly homogeneous lifestyle among the information elite that transcends the cultural borders of all societies: the regular use of SPA installations (even when traveling), and the practice of jogging; the mandatory diet of grilled salmon and green salad, with *udon* and *sashimi* providing a Japanese functional equivalent; the "pale chamois" wall color intended to create the cozy atmosphere of the inner space; the ubiquitous laptop computer, and Internet access; the combination of business suits and sportswear; the unisex dressing style, and so on. All these are symbols of an international culture whose identity is not linked to any specific society but to membership of the managerial circles of the informational economy across a global cultural spectrum.

The call for cultural connectedness of the space of flows between its

78 Blakely and Snyder (1997).

different nodes is also reflected in the tendency toward the architectural uniformity of the new directional centers in various societies. Paradoxically, the attempt by postmodern architecture to break the molds and patterns of architectural discipline has resulted in an overimposed postmodern monumentality which became the generalized rule of new corporate headquarters from New York to Kaoshiung during the 1980s. Thus, the space of flows includes the symbolic connection of homogeneous architecture in the places that constitute the nodes of each network across the world, so that architecture escapes from the history and culture of each society and becomes captured into the new imaginary, wonderland world of unlimited possibilities that underlies the logic transmitted by multimedia: the culture of electronic surfing, as if we could reinvent all forms in any place, on the sole condition of leaping into the cultural indefinition of the flows of power. The enclosure of architecture into an historical abstraction is the formal frontier of the space of flows.

The Architecture of the End of History

Nomada, sigo siendo un nomada.

Ricardo Bofill[79]

If the space of flows is truly the dominant spatial form of the network society, architecture and design are likely to be redefined in their form, function, process, and value in the coming years. Indeed, I would argue that all over history, architecture has been the "failed act" of society, the mediated expression of the deeper tendencies of society, of those that could not be openly declared but yet were strong enough to be cast in stone, in concrete, in steel, in glass, and in the visual perception of the human beings who were to dwell, deal, or worship in such forms.

Panofsky on Gothic cathedrals, Tafuri on American skyscrapers, Venturi on the surprisingly kitsch American city, Lynch on city images, Harvey on postmodernism as the expression of time/space compression by capitalism, are some of the best illustrations of an intellectual tradition that has used the forms of the built environment as one of the most signifying codes to read the basic structures of society's dominant values.[80] To be sure, there is no simple, direct inter-

79 Opening statement of Ricardo Bofill's architectural autobiography, *Espacio y Vida* (Bofill 1990).

80 Panofsky (1957); Lynch (1960); Tafuri (1971); Venturi et al. (1977); Harvey (1990).

pretation of the formal expression of social values. But as research by scholars and analysts has revealed, and as works by architects have demonstrated, there has always been a strong, semiconscious connection between what society (in its diversity) was saying and what architects wanted to say.[81]

Not any more. My hypothesis is that the coming of the space of flows is blurring the meaningful relationship between architecture and society. Because the spatial manifestation of the dominant interests takes place around the world, and across cultures, the uprooting of experience, history, and specific culture as the background of meaning is leading to the generalization of ahistorical, acultural architecture.

Some tendencies of "postmodern architecture," as represented for instance by the works of Philip Johnson or Charles Moore, under the pretext of breaking down the tyranny of codes, such as modernism, attempt to cut off all ties with specific social environments. So did modernism in its time, but as the expression of an historically rooted culture that asserted the belief in progress, technology and rationality. In contrast, postmodern architecture declares the end of all systems of meaning. It creates a mixture of elements that searches formal harmony out of transhistorical, stylistic provocation. Irony becomes the preferred mode of expression. Yet, in fact what most postmodernism does is to express, in almost direct terms, the new dominant ideology: the end of history and the supersession of places in the space of flows.[82] Because only if we are at the end of history can we now mix up everything we knew before (see figure 6.6). Because we do not belong any longer to any place, to any culture, the extreme version of postmodernism imposes its codified code-breaking logic anywhere something is built. The liberation from cultural codes hides in fact the escape from historically rooted societies. In this perspective, postmodernism could be considered the architecture of the space of flows.[83]

The more that societies try to recover their identity beyond the global logic of uncontrolled power of flows, the more they need an architecture that exposes their own reality, without faking beauty from a transhistorical spatial repertoire. But at the same time, oversignificant architecture, trying to give a very definite message or to express directly the codes of a given culture, is too primitive a form to be able to

81 See Burlen (1972).

82 I find my own understanding of postmodernism and postmodern architecture very close to David Harvey's analysis. But I shall not take responsibility for using his work in support of my position.

83 For a balanced, intelligent discussion of the social meaning of postmodern architecture, see Kolb (1990); for a broader discussion of the interaction between globalization/informationalization processes and architecture, see Saunders, (1996).

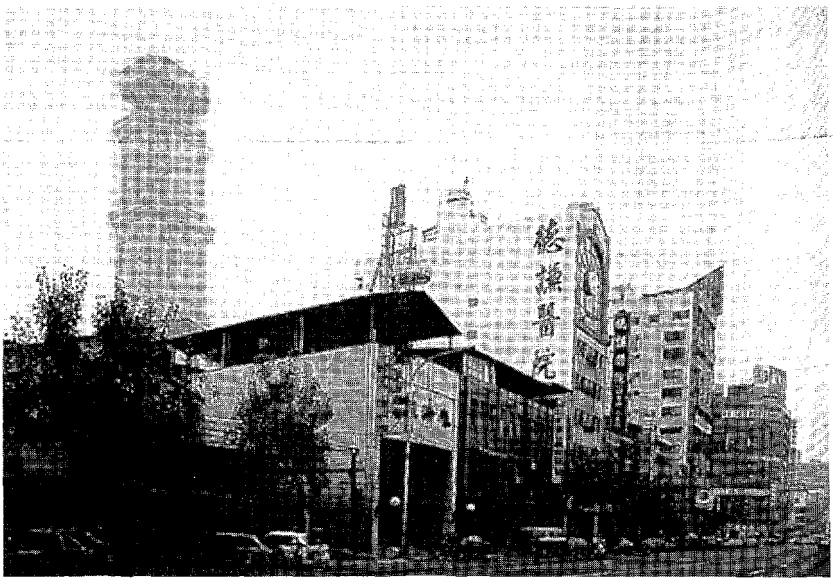

Figure 6.6 Downtown Kaoshiung (photograph: Professor Hsia Chu-joe)

penetrate our saturated visual imaginary. The meaning of its messages will be lost in the culture of "surfing" that characterizes our symbolic behavior. This is why, paradoxically, the architecture that seems most charged with meaning in societies shaped by the logic of the space of flows is what I call "the architecture of nudity." That is, the architecture whose forms are so neutral, so pure, so diaphanous, that they do not pretend to say anything. And by not saying anything they confront the experience with the solitude of the space of flows. Its message is the silence.

For the sake of communication, I shall use two examples drawn from Spanish architecture, an architectural milieu that is widely recognized as being currently at the forefront of design. Both concern, not by accident, the design of major communication nodes, where the space of flows materializes ephemerally. The Spanish festivities of 1992 provided the occasion for the construction of major functional buildings designed by some of the best architects. Thus, the new Barcelona airport, designed by Bofill, simply combines beautiful marble floor, dark glass façade, and transparent glass separating panels in an immense, open space (see figure 6.7). No cover up of the fear and anxiety

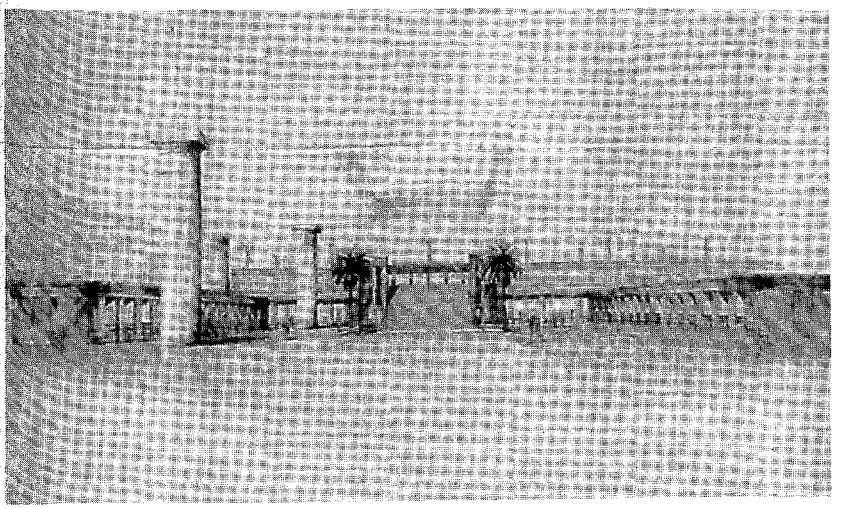

Figure 6.7 The entrance hall of Barcelona airport
Source: Original drawing by Ricardo Bofill; reproduced by kind permission of Ricardo Bofill

that people experience in an airport. No carpeting, no cozy rooms, no indirect lighting. In the middle of the cold beauty of this airport passengers have to face their terrible truth: they are alone, in the middle of the space of flows, they may lose their connection, they are suspended in the emptiness of transition. They are, literally, in the hands of Iberia Airlines. And there is no escape.

Let us take another example: the new Madrid AVE (high-speed train) station, designed by Rafael Moneo. It is simply a wonderful old station, exquisitely rehabilitated, and made into an indoor palm-tree park, full of birds that sing and fly in the enclosed space of the station. In a nearby structure, adjacent to such a beautiful, monumental space, there is the real station with the high-speed train. Thus, people go to the pseudo-station, to visit it, to walk through its different levels and paths, as they go to a park or a museum. The too-obvious message is that we are in a park, not in a station; that in the old station, trees grew, and birds nested, operating a metamorphosis. Thus, the high-speed train becomes the oddity in this space. And this is in fact the question everybody in the world asks: what is a high-speed train doing there, just to go from Madrid to Seville, with no connection whatsoever with the European high-speed network, at a cost of US$4 billion? The broken mirror of a segment of the space of flows becomes exposed, and the

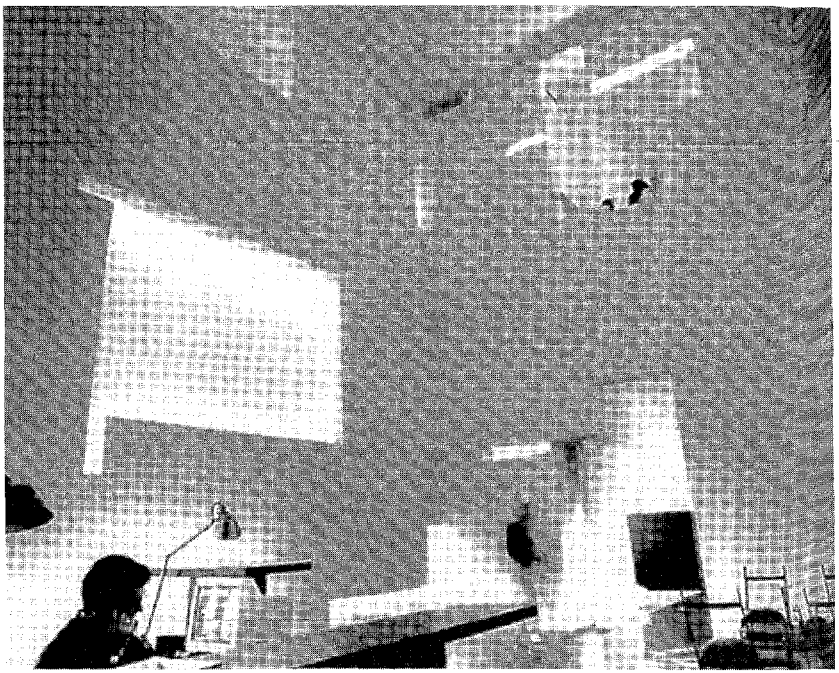

Figure 6.8 The waiting room at D.E. Shaw and Company: no ficus trees, no sectional sofas, no corporate art on the walls
Source: Muschamp (1992)

use value of the station recovered, in a simple, elegant design that does not say much but makes everything evident.

Some prominent architects, such as Rem Koolhas, the designer of the Lille Grand Palais Convention Center, theorize the need to adapt architecture to the process of de-localization, and to the relevance of communication nodes in people's experience: Koolhas actually sees his project as an expression of the "space of flows." Or, in another instance of a growing self-awareness of architects about the structural transformation of space, the American Institute of Architects' award-winning design of D.E. Shaw and Company's offices by Steven Holl in New York's West 45th Street (figure 6.8):

> offers [in Herbert Muschamp's words] a poetic interpretation of . . . the space of flows . . . Mr Holl's design takes the Shaw offices to a place as novel as the information technology that paid to build them. When we walk in the door of D.E. Shaw we know we are not in 1960s Manhat-

> tan or Colonial New England. For that matter, we have left even much of present day New York far below on the ground. Standing inside the Holl atrium we have got our head in the clouds and our feet firmly planted on solid air.[84]

Granted we may be forcing Bofill, Moneo, and even Holl into discourses that are not theirs.[85] But the simple fact that their architecture would allow me, or Herbert Muschamp, to relate forms to symbols, to functions, to social situations, means that their strict, retained architecture (in rather formally different styles) is in fact full of meaning. Indeed, architecture and design, because their forms either resist or interpret the abstract materiality of the dominant space of flows, could become essential devices of cultural innovation and intellectual autonomy in the informational society through two main avenues. Either the new architecture builds the palaces of the new masters, thus exposing their deformity hidden behind the abstraction of the space of flows; or it roots itself into places, thus into culture, and into people.[86] In both cases, under different forms, architecture and design may be digging the trenches of resistance for the preservation of meaning in the generation of knowledge. Or, which is the same, for the reconciliation of culture and technology.

Space of Flows and Space of Places

The space of flows does not permeate down to the whole realm of human experience in the network society. Indeed, the overwhelming majority of people, in advanced and traditional societies alike, live in places, and so they perceive their space as place-based. *A place is a locale whose form, function, and meaning are self-contained within the boundaries of physical contiguity.* A place, to illustrate my argument, is the Parisian *quartier* of Belleville.

Belleville was, as for so many immigrants throughout its history, my entry point to Paris, in 1962. As a 20–year-old political exile, without

84 Muschamp (1992).

85 For Bofill's own interpretation of Barcelona airport (whose formal antecedent, I believe, is his design for Paris's Marché St Honoré), see his book: Bofill (1990). However, in a long personal conversation, after reading the draft of my analysis, he did not disagree with my interpretation of the project of an "architecture of nudity," although he conceived it rather as an innovative attempt to bring together high-tech and classic design. We both agreed that the new architectural monuments of our epoch are likely to be built as "communication exchangers" (airports, train stations, intermodal transfer areas, telecommunication infrastructures, harbors, and computerized trading centers).

86 For a useful debate on the matter, see Lillyman et al. (1994).

Figure 6.9 Belleville, 1999: a multicultural, urban place (photograph: Irene Castells and Jose Bailo)

much to lose except my revolutionary ideals, I was given shelter by a Spanish construction worker, an anarchist union leader, who introduced me to the tradition of the place. Nine years later, this time as a sociologist, I was still walking Belleville, working with immigrant workers' committees, and studying social movements against urban renewal: the struggles of what I labeled "*La Cité du Peuple,*" reported in my first book.[87] More than thirty years after our first encounter, both Belleville and I have changed. But Belleville is still a place, while I am afraid I look more like a flow. The new immigrants (Asians, Yugoslavs) have joined a long-established stream of Tunisian Jews, Maghrebian Muslims, and southern Europeans, themselves the successors of the intra-urban exiles pushed into Belleville in the nineteenth century by the Hausmannian design of building a bourgeois Paris. Belleville itself has been hit by several waves of urban renewal, intensified in the 1970s.[88] Its traditional physical landscape of a poor but harmonious historic *faubourg* has been messed up with plastic

87 Castells (1972: 496ff).

88 For an updated social and spatial, illustrated history of Belleville, see the delightful book by Morier (1994); on urban renewal in Paris in the 1970s, see Godard et al. (1973).

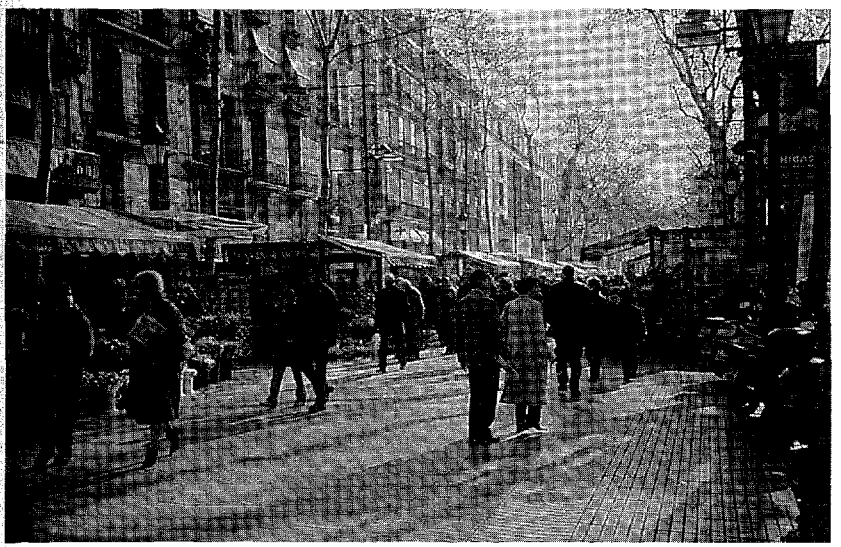

Figure 6.10 Las Ramblas, Barcelona, 1999: city life in a liveable place (photograph: Jordi Borja and Zaída Muxi)

postmodernism, cheap modernism, and sanitized gardens on top of a still somewhat dilapidated housing stock. And yet, Belleville in 1999 is a clearly identifiable place, both from the outside and from the inside (see figure 6.9). Ethnic communities that often degenerate into hostility toward each other coexist peacefully in Belleville, although keeping track of their own turf, and certainly not without tensions. New middle-class households, generally young, have joined the neighborhood because of its urban vitality, and powerfully contribute to its survival, while self-controlling the impacts of gentrification. Cultures and histories, in a truly plural urbanity, interact in the space, giving meaning to it, linking up with the "city of collective memory" *à la* Christine Boyer.[89] The landscape pattern swallows and digests substantial physical modifications, by integrating them in its mixed uses and active street life. Yet Belleville is by no means the idealized version of the lost community, which probably never existed, as Oscar Lewis demonstrated in his revisit of Tepoztlan. Places are not necessarily communities, although they may contribute to community-building. But the life of their inhabitants is marked by their characteristics, so that they are indeed good and bad places depending on the value judgement

89 Boyer (1994).

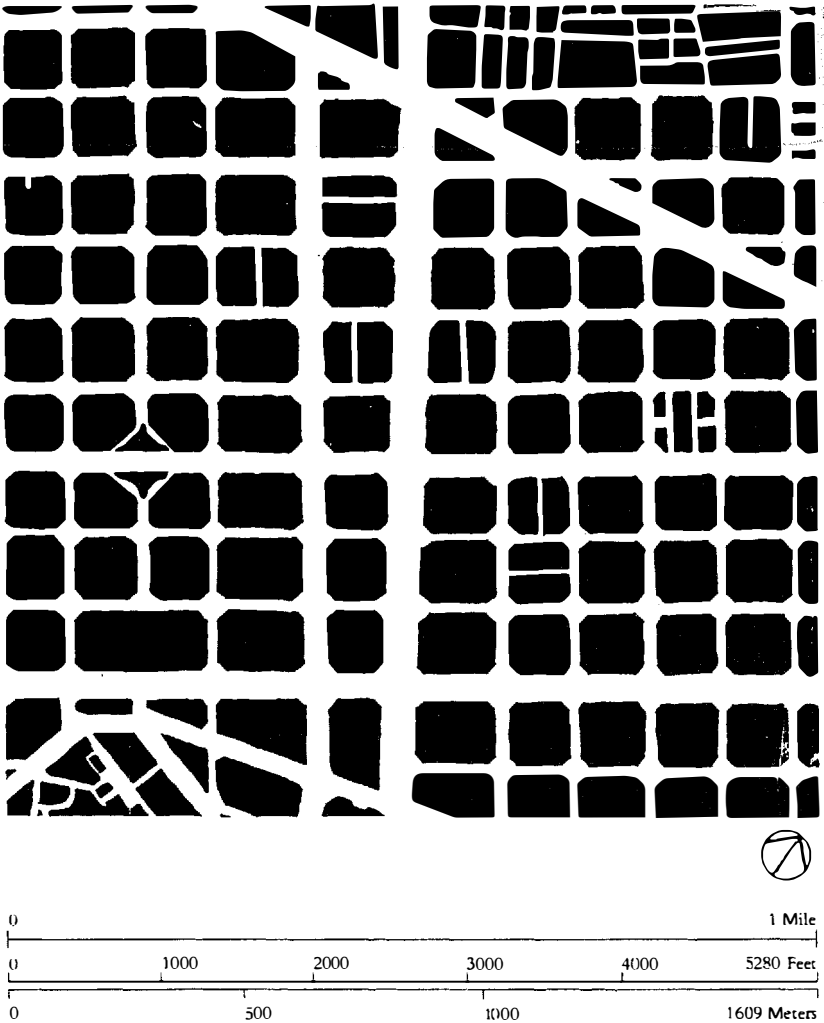

Figure 6.11 Barcelona: Paseo de Gracia
Source: Jacobs (1993)

of what a good life is (see figure 6.10). In Belleville, its dwellers, without loving each other, and while certainly not being loved by the police, have constructed throughout history a meaningful, interacting space, with a diversity of uses and a wide range of functions and expressions. They actively interact with their daily physical environment. In between home and the world, there is a place called Belleville.

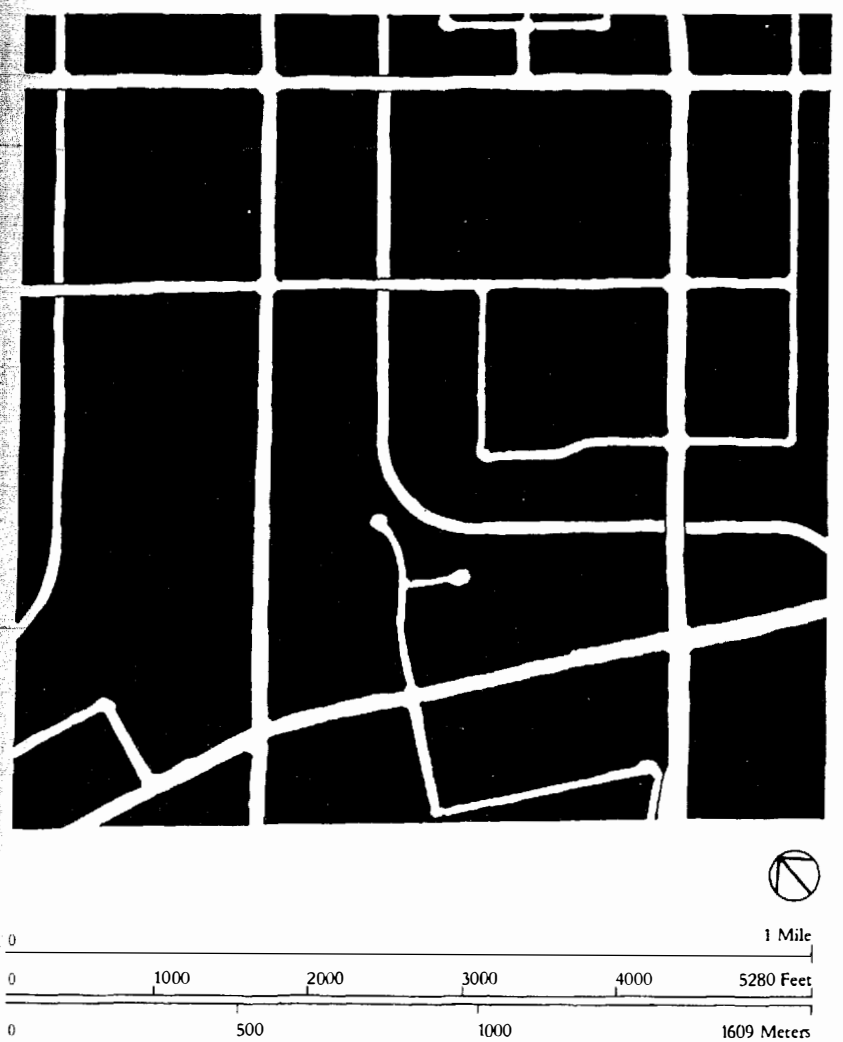

Figure 6.12 Irvine, California: business complex
Source: Jacobs (1993)

Not all places are socially interactive and spatially rich. It is precisely because their physical/symbolic qualities make them different that they are places. Thus Allan Jacobs, in his great book about *Great Streets*,[90] examines the difference in urban quality between Barcelona

90 Jacobs (1993).

and Irvine (the epitome of suburban southern California) on the basis of the number and frequency of intersections in the street pattern: his findings go even beyond what any informed urbanist could imagine (see figures 6.11 and 6.12). So Irvine is indeed a place, although a special kind of place, where the space of experience shrinks inward toward the home, as flows take over increasing shares of time and space.

The relationships between the space of flows and the space of places, between simultaneous globalization and localization, are not predetermined in their outcome. For instance, Tokyo underwent a substantial process of urban restructuring during the 1980s to live up to its role as "a global city," a process fully documented by Machimura. The city government, sensitive to the deep-seated Japanese fear about the loss of identity, added to its business-oriented restructuring policy an image-making policy of singing the virtues of old Edo, pre-Meiji Tokyo. An historical museum (*Edo-Tokyo Hakubutsakan*) was opened in 1993, a public relations magazine was published, exhibitions regularly organized. As Machimura writes, "Although these views seem to go in totally different directions, both of them seek for redefinition of the Westernized image of the city in more domestic ways. Now, "Japanization" of the Westernized city provides an important context for the discourse about "global city" Tokyo after modernism."[91] Yet Tokyo citizens were not complaining just about the loss of historical essence, but about the reduction of their everyday life's space to the instrumental logic of the global city. A project symbolized this logic: the celebration of a World City Fair in 1997, a good occasion to build another, major business complex on reclaimed land in Tokyo Harbor. Large construction companies happily obliged, and work was well underway in 1995. Suddenly, in the 1995 municipal election, an independent candidate, Aoshima, a television comedian without backing from political parties or financial circles, campaigned on a one-issue program: to cancel the World City Fair. He won the election by a large margin, and became governor of Tokyo. A few weeks later, he kept his campaign promise and canceled the World City Fair to the disbelief of the corporate elite. The local logic of civil society was catching up with, and contradicting, the global logic of international business.

Thus, people do still live in places. But because function and power in our societies are organized in the space of flows, the structural domination of its logic essentially alters the meaning and dynamic of places. Experience, by being related to places, becomes abstracted from power,

91 Machimura (1995: 16). See his book on the social and political forces underlying the restructuring of Tokyo: Machimura (1994).

and meaning is increasingly separated from knowledge. There follows a structural schizophrenia between two spatial logics that threatens to break down communication channels in society. The dominant tendency is toward a horizon of networked, ahistorical space of flows, aiming at imposing its logic over scattered, segmented places, increasingly unrelated to each other, less and less able to share cultural codes. Unless cultural, political, *and physical* bridges are deliberately built between these two forms of space, we may be heading toward life in parallel universes whose times cannot meet because they are warped into different dimensions of a social hyperspace.

Summary of the Contents of Volumes II and III

Throughout this first volume of *The Information Age: Economy, Society and Culture*, reference has been made to the themes presented in Volumes II and III of this work. An outline of their contents is given below.

Volume II: *The Power of Identity*

Our World, our Lives

1 Communal Heavens: Identity and Meaning in the Network Society
2 The Other Face of the Earth: Social Movements against the New Global Order
3 The Greening of the Self: the Environmental Movement
4 The End of Patriarchalism: Social Movements, Family, and Sexuality in the Information Age
5 A Powerless State?
6 Informational Politics and the Crisis of Democracy

Conclusion: Social Change in the Network Society

Volume III: *End of Millennium*

A Time of Change

1 The Crisis of Industrial Statism and the Collapse of the Soviet Union
2 The Rise of the Fourth World: Informational Capitalism, Poverty, and Social Exclusion

3 The Perverse Connection: the Global Criminal Economy
4 Development and Crisis in the Asian Pacific: Globalization and the State
5 The Unification of Europe: Globalization, Identity, and the Network State

Conclusion: Making Sense of our World