1. Introduction

This opening chapter for the book will begin with an exposition of the book objectives and structure. It will then move to brief discussions of the three primal notions, which constitute the basis for this book: information, virtual spatial mobility, and connectivity. The satiation of needs that emerge out of these notions comprise the essence for the double abilities of the Internet and its extensive implementation: a comprehensive and most powerful medium for the storing and transmission of all types of information, side by side with the provision of comprehensive connectivity among both people and things, notably within urban settings. In this book we are about to examine these two abilities of the Internet within urban contexts, bringing about the very basing of contemporary cities on Internet connectivity and information storing and transmission.

1.1 BOOK OBJECTIVES AND SCOPE

The objective of this book is to highlight and interpret the Internet-based city. The book will do so by way of exposition of the numerous dimensions of Internet-based cities. These expositions will be followed by discussions attempting at interpretations of the significances of this new phase of urban connectivity. The Internet-based city constitutes a wider concept than that of smart cities, a concept which we will highlight later, in Chapter 7. The Internet-based city assumes the application of a single technology, the Internet, for the operations of all the partners who share the urban scene, whereas smart cities assume the wider implementation of computing at large, and usually so for urban system operations only.

The book is divided into three parts. The first part deals with urban connectivity and information activities and it will provide three necessary backgrounds for the following two additional parts of the book. Thus, in this chapter we will focus on the basic notions required for understanding the Internet-based city. In the following chapter, we will review the traditional connectivity roles and operations of cities, whereas in the third chapter we will move to the exposure of the Internet and the Internet of Things (IoT), notably their development and structure. The second part of the book is devoted to urban Internet activities, presenting a series of expositions for the numerous urban uses of the Internet, as pursued by numerous partners of the urban scene.
First, by individuals in their consumption of urban services, highlighting their activities in this regard, as well as their functioning in dual (physical and virtual) or hybrid space. Second, by companies making use of the Internet, coupled with the Intranet and the hidden Internet, side by side with the emergence of local knowledge economies. Third, by local governments employing IoT for the operation and control of urban systems, and, fourth, by carmakers engaged in the development of the upcoming autonomous vehicles (AVs), which are about to be Internet-communicative. The third part of the book will focus on several interpretations for urban Internet activities from a rather general city perspective: first, some general features of the Internet-based city will be outlined, followed by speculations on possible changes in urban spatial organization. The book will conclude with interpretations of the Internet-based city from the perspective of the Internet as a general-purpose technology (GPT), followed by a proposed model for three phases for Internet applications yielding Internet implications.

The book chapters will be based on the existing literature in related fields, mainly within geography, mobility, urban studies, urban planning, urban sociology, and Internet studies. It will further be based on internationally comparative data, as recent as only available, side by side with original interpretations and analyses.

1.2 INFORMATION

‘Information’ is a term used somehow ambiguously, notably since the introduction of information technology (IT), which has permitted the storage, processing and transmission of enormous quantities of information in electronic formats (see Wilson et al. 2013). On the one hand, information constitutes a kind of an ‘umbrella spectrum’ containing within it a family of four communicative, mostly codified, classes of things: data, information, knowledge and innovations. On the other hand, however, the term information, in a rather restricted sense, constitutes a specific class of communicative material, which is included within the wider spectrum of information. The Internet stores and transmits all four classes of information. Sometimes, however, some specific attention may be given to specific information classes. For instance, when discussing knowledge economies (Chapter 6), innovation may be in the focus, whereas IoT transmits mainly data (Chapters 7‒8).

As for information at large, Roszak (1991, 13) noted: ‘in its new technical sense, information has come to denote whatever can be coded for transmission through a channel that connects a source with a receiver, regardless of semantic content’. Information at large is obviously something intangible, though its containers or media are tangible. Traditionally these have been paper-based products, such as books, magazines, letters, documents, lists and
The emergence of electronic transmission and storage media, mainly radio, TV, cassettes, numerous types of discs, coupled with computers and the Internet, have once again accentuated the intangible and abstract character of information.

The four classes of communicative materials, namely data, information, knowledge and innovation, have each received numerous independent definitions. Some basic definitions and observations for them are as follows:

1. **Data**: ‘a series of observations, measurements, or facts in the form of numbers, words, sounds and/or images. Data have no meaning but provide the raw material from which information is produced’ (Roberts 2001, 100).

2. **Information**: Information, as a sub-class of the more general wider spectrum of information, might be a statement or even just a word. It has received numerous definitions, estimated at over 100, proposed in about 40 disciplines (see e.g. Machlup 1983; Braman 1989). Information was further claimed to constitute several things, such as an activity, a life form and a relationship (Barlow 1994), as a resource, commodity, perception of pattern, and even as a constitutive force in society (Braman 1989).

3. **Knowledge**: Definitions of knowledge refer to its relation to information. Knowledge has, thus, been defined as ‘the application and productive use of information. Knowledge is more than information … It involves an awareness or understanding gained through experience, familiarity or learning’ (Roberts 2001, 100–101). For Roszak (1991, 105) ‘ideas create information, not the other way around. Every fact grows from an idea’. Other commentators, however, such as Boisot (1998, 12), argues that ‘knowledge builds on information that is extracted from data’. In addition, a kind of two-way relationship between knowledge and information was illuminated by Postman (1999, 93), as follows:

   I define knowledge as organized information, information that has a purpose, that leads one to seek further information in order to understand something about the world. Without organized information, we may know something of the world, but very little about it. When one has knowledge, one knows how to make sense of information, knows how to relate information to one’s life, and, especially knows when information is irrelevant.

Bell (1976, 175; see also Castells 2000, 17) added to the meaning of knowledge the communications element: ‘knowledge is a set of organized statements of facts or ideas, presenting a reasoned judgement or an experimental result, which is transmitted to others through some communication medium in some systematic form’. On the other hand, knowledge may also be created without the involvement of information and communications:

‘Information is acquired by being told, whereas knowledge can be acquired
by thinking …. Thus, new knowledge can be acquired without new information being received’ (Machlup 1983, 644). Similarly also, ‘information transfer is always necessary to knowledge exchange, the reverse is not always true’ (Storper 2000, 56).

4. Innovation: Innovation may be defined as the creation of new knowledge, through an intrinsically uncertain problem solving process, based on existing knowledge and/or information. Innovative knowledge may lead to the introduction of innovative products or to the application of novel production processes, involving either radical breakthroughs or incremental improvements (Feldman 1994, 2; Feldman 2000, 373–375; Wilson et al. 2013, 13). Thus, knowledge may be viewed as an asset, serving as an input (competence), which may lead to the production of innovation as an output. Newly created innovations become new pieces of knowledge (OECD 2000, 13).

1.3 VIRTUAL SPATIAL MOBILITY

Spatial mobility in general has been outlined elsewhere (Kellerman 2018a), and our brief attention here will be given specifically to virtual spatial mobility. The recent telecommunications/information revolution has emphasized the virtual dimension of the term spatial mobility, referring to the human ability to move the rather abstract entity of information electronically over space, and thus carrying out virtual spatial mobility. Electronically transmitted information may constitute a virtual extension of the self, through a phone call or through an email. Alternatively, moved information may constitute public pieces of information, available through websites. Such website information is generally not being transmitted as one-to-one messages or as one-to-many messages, oriented from one user to some specifically denoted receivers. Rather, website information constitutes on-demand retrieved information. Another type of virtually moved information is information sent to and from devices through IoT. Such information may move because of human actions ordering such movement. In other cases, a device may autonomously initiate such moving of information, as will be the case, for instance, with the future AVs.

The physical mobility of people has growingly involved, as of the 1970s, virtual transfers of their information, as well. For instance, information transmitted for travel booking and travel coordination, or for traffic control. Thus, communication has become a key for the management of people’s physical mobility. From yet another angle of joint physical and virtual mobilities, it has become possible for individuals to move corporeally while simultaneously communicating virtually through smartphones. Moreover, even the mobilities
of people and objects are interrelated: ‘There are objects that enable people to travel across distance; there are objects that enable people to travel forming complex hybrids … there are objects and people that move together’ (Urry 2007, 50). The mass moving of objects has become increasingly organized and controllable through Internet-connected logistics as well as modal transportation. Individuals, on the other hand, tend, in many cases, to prefer individual mobility for their daily commuting, making use of personal mobility vehicles, that is, cars, cycles, and bicycles.

1.4 CONNECTIVITY

Connectivity may carry numerous geographical connotations, notably within biogeography (see Hodgetts 2018). Linguistically, connectivity was defined as ‘the quality, state, or capability of being connective or connected’ (Merriam-Webster 2018). Connectivity was originally attributed to humans and animals, implying both their physical and virtual mobilities. However, connectivity can currently be applied to non-living things, as well, since such things have become connective through IoT. For humans there are several ways and media for getting connected, and before moving to the highlighting of several specific communications technologies, in the following chapters, we will elaborate here on some of their comparative features, within an evolutionary framework, also in comparison to physical mobility via automobiles.

Wellman (2001) outlined several phases for the conduct of social relations, following the adoption of personal transportation and communications technologies, as compared to the mass media of radio and television, which offer one-to-many communications. Each of these phases was typified by some specific patterns of presence and co-presence. The first phase of social relations was defined as the traditional and non-technological door-to-door communications for people, for instance when walking out of home for visits with each other, visits which obviously involve face-to-face co-presence and direct connectivity. This type of communication required synchronous presence (or co-presence) of the communicating parties in a jointly attended location in physical space (Yu and Shaw 2008).

The automobile and the telephone have brought about the development of a second phase in social relations, namely place-to-place ones. These place-to-place social relations offered some flexibility in the location of people’s social relations, so that they partially replaced the local door-to-door relations. Place-to-place communications and co-presence consist, therefore, of face-to-face ones in physical space using cars, side by side with virtual ones, over the telephone. These communications and co-presences were further termed as synchronous telepresence (or co-presence) (Yu and Shaw 2008).
The two media of automobiles and telephones have presented several features of contacting. The automobile has made it possible for people to reduce drastically the friction of distance for the meeting of fellow people located significantly far from their own locations, thus facilitating some additional face-to-face contacts. On the other hand, however, direct dialing through the fixed-line telephone fully nullified the friction of distance. In the past, long-distance calling involved high calling rates, thus permitting only a rather limited transmission of information routinely. In addition, past long-distance calling through fixed-line telephones required fixed locational co-presences of the interacting parties for the performance of audial and non-visual conversations (Kellerman 2006).

Later, but still within the second phase of place-to-place social relations, the introduction of the Internet has enhanced place-to-place relations and co-presences and has turned them more complex. Users of the Internet can engage in video calls, and they can further enjoy virtual face-to-face co-presences while being physically located in fixed physical locations, simultaneously with their locations in virtual spaces (see e.g. Kaufmann 2002, 28; Urry 2000, 71). This kind of face-to-face co-presence was referred to as simultaneous embodied and response presences (Knorr-Cetina and Bruegger 2002).

Internet communications presented a distinct mode of communications as compared to the telephone. On the one hand, Internet written communications, notably emailing, is both locationally and temporally flexible, since it does not require the synchronous attendance in time of the communicating parties at particular sites, next to their computers. Such Internet written offline communications constitute, therefore, *asynchronous telepresence* (Yu and Shaw 2008), and it does not imply co-presence by the communicating parties. On the other hand, however, Internet online written, as well as audial or audiovisual chats, constitute enhanced synchronous telepresence and co-presence, similar to those originally facilitated by the telephone.

The most significant contribution of the Internet to new patterns of co-presence has emerged through the introduction and wide adoption of portable communications devices, such as laptops, tablets, and above all smartphones, since these devices permit wireless, and thus placeless, communications. The use of portable communications devices implies the emergence of a third phase in social networking, namely that of *person-to-person* communications. Thus, in this type of synchronous telepresence or co-presence, both of the communicating parties can be fully detached from any fixed locations.

1.5 CONCLUSION

We noted in this chapter that information, in its wide spectrum, comprises the four elements of data, information in a stricter sense referring to statements,
knowledge and innovation. People may communicate widely through virtual mobility media, currently led by the Internet. The levels and forms of human connectivity may differ by the chosen communications media. Devices can communicate contemporarily as well, through the IoT.

The three basic notions of information, spatial mobility and connectivity, which were briefly outlined in this chapter, present jointly the ability to move information to any connected others, whether they be humans or devices. This human ability and its pursuance have always constituted one of the essential elements of urban life. Human connectivity and informational activities have been upgraded, thus becoming most extensive as of the development of communications technologies and media, and peaking with the emergence of the Internet and smartphones. As we will note in the following chapters, these devices and media have facilitated full locational flexibility for human connectivity and informational activities. Furthermore, and as we will see in the following chapters, the Internet has further facilitated the instant transmission of all types of information to and from people, to and from wherever they are located or moving. Side by side with the expansion and upgrading of human connectivity, IoT has extended connectivity to non-living devices, as well.