

Use of space in the information society age

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Introduction

The first part of this chapter is devoted to the changes in mankind's relation to space, highlighting those milestones that facilitated the mapping of the world and the rapid overcoming of physical distances. The technology that was necessary to make these achievements possible – for example information and communication technologies and rapidly developing means of transportation – were a prerequisite for **globalisation** to take place, a process that first led to the discovery of the world, then to its more extended exploration and eventually to its actual transformation.

The next part takes a brief look at how the spreading of information and communication technologies gave rise to a new world, the three most important characteristics of which are globality and the emergence of network operation and of a global media culture. All these three characteristics are linked to some extent to humankind's relation to space and time: as a result of globalisation the significance of space changes; under the influence of technology the effect of physical distance is gradually decreased; the presence of the media promotes spatial perception and instancy, and it is network operation that creates the organisational framework for economic players and thus provides and enhances the conditions required by global production and economic operation.

Finally, the concepts of **virtual reality** and **cyberspace** will be reviewed, the latter one being closely linked to science fiction, since even the expression itself was coined by William Gibson in his book *Neuromancer* (Gibson, 1984). The chapter will conclude with some thoughts on the possible practical applications of virtual reality.

Changes in the built environment – thoughts on the socio-historical approach to space

I. Physical space in transformation

Throughout its history mankind strove to discover and conquer the space it was surrounded by. Eventually, all corners of the Earth were discovered by the various civilisations, and the development of the means of transportation drastically decreased the importance of physical distances. Accordingly, the boundaries of physical space expanded driven by technological development, as the time required to overcome distances was reduced to a fraction of what it had been originally.

The great explorations of the 15th-17th centuries created the Globe as we know it today. The proportion of its geographical areas known to European civilisation and then conquered by European interests increased 100-fold over a period of some 100 years. In this expanded space the time taken to get from one place to another was reduced to a fragment of what it had once been¹ by the rapid development of transport technology. While it had taken several days to cover 100 kilometres on foot, the same distance could be travelled in a matter of one or two hours by train and steam engine, the two signature inventions of the industrial revolution.² The next fundamental advance was the emergence of the automobile, bringing about an increase in the individual's freedom of space.

It was most probably automobile transport that brought about the most significant change in the 20th century in regard to the social significance of space. There is a complex system of technological and social changes that is linked to the automobile. John Urry (1999) examined six components when he wrote about the car as

- the result of a production process,
- the object of individual consumption,
- a mechanical apparatus,
- the means of private mobility,
- a cultural factor,
- and the user of natural resources.

The development of automobile transport in America is closely connected to the construction of the unified network of interstate highways linking towns and cities. Work on the almost 70 thousand kilometres of road network began in 1956, and the costs were financed from the increased tax that was built into the price of petrol.

¹ Paradoxically, this also meant that time spent travelling increased on average because people travelled more. Travelling became a customary activity no longer considered dangerous as it was before. Thus, the same distance could be covered within a shorter time than earlier but on the whole people did not actually spend less time travelling.

² Provided that there was a rail line in the given area. Otherwise, the distance had to be covered on horseback, with horse-drawn carts or on foot.

The role played by the interstate highway network points beyond that of simple infrastructure, since it has become a cultural icon, primarily as a result of the television and film industries. Motoring has even created its own film genre, and these films have played a major part in giving a strong social significance to this form of travelling.³

Travelling by car assumed a fundamental role in regard to the impact of globalisation on everyday life as well as the emergence of the network society. Urry calls attention to several social effects that are closely linked to motorised transport.

- The workplace and the home have become separated since transportation is often done by car or public transport.
- Members of the same family live far from one another and regular family reunions can only be realised by overcoming physical distances which puts a strain on infrastructure especially during holiday periods.
- People can seemingly save time by using the various means of transportation; however, they often get caught in traffic jams and are delayed.

Another compelling feature of the development of transportation networks is that the building of road networks led to much more efficient channels of transportation which significantly reduced relative spatial distance. However, those that cannot access these channels are put at a disadvantage greatly (Brunn – Leinbach, 1991; quoted in Urry, 1999). Thus, modernisation and the uneven development of transportation networks gave rise to new types of inequality.

One efficient way of decreasing these inequalities might be through the dissemination of information and communication technologies; for example, these technologies can provide access to information regardless of physical closeness to the traditional channels, which is even in the smallest settlements.⁴

Interestingly, the emergence of the information society coincides with man's expedition into space. One of the first milestones of mankind's conquest of space was the launch of the Soviet satellite Sputnik-1 in 1957.⁵ Today's satellites used in telecommunication, localization and in television broadcasting would also not exist without space exploration, and information society would be different if Sputnik had not been launched.⁶

In order to understand the changes that were brought about by technological development in people's sense of space and the social use of space, it is important to consider the process of urbanisation as an antecedent. Urbanisation denotes the process whereby a significant proportion of those living in villages flood into towns and cities, thus increasing their population, while at the same time the quantity of local services in villages expands and its quality is improved. The expansion of towns and cities is made possible by the (sub)urbanisation of its environs and is necessitated partly by the increased demand for labour and the decreased demand for agricultural work.

At the turn of the 19th and 20th centuries only 13 percent of the Earth's population lived in towns and cities. According to "World Urbanisation Prospects" published by the UN in 2005, by the 1950s the proportion of people living in towns and cities grew to 29 percent and nearly 50 percent of the world's population lived in towns and cities in 2005.

³ Some films in the Road Movie genre include *Easy Rider*, *Duel*, and *Thelma and Louise*.

⁴ However, the emergence of these devices did not put an end to social inequalities. What is more, it created new ones. Elisa Mancinelli's chapter addresses this issue in more detail.

⁵ Of course the conquest of space can be traced back before this date since the V-2 rocket was successfully launched into space by Nazi Germany in 1942, although their aim was not to explore the universe but rather to destroy various terrestrial targets.

⁶ It must be mentioned that ARPA (Advanced Research Projects Agency), a pioneer in the field of Internet development, was established as a reaction to the "Sputnik shock"; it was part of the package that Americans worked out in response to the launch of the Sputnik.

Conquering physical space was accompanied by a shrinking of nature. Giant metropolises developed all over the world and they are becoming increasingly great. Since the 1990s the biggest cities have been called megalopolises when their respective populations exceed 10 million and their population per square kilometre reaches 2,000. Such Megalopolises include Mexico City, Seoul in South Korea and New York.

2. Global communication

The industrial revolution generated the acceleration of transport, which was a primary turning point in developments to overcome physical distances and achieve the faster movement of goods and people. The information revolution that emerged in the second half of the 20th century brought about a sudden rise in the speed of information flow, which directly affects people's notions of space.

The latter part of this chapter will explain how the emergence of the media and the acceleration of the information flow enable people to be aware of events taking place in every corner of the world that has been conquered by mankind. Consequently, the proportion of information an individual possesses about areas that lie far from their own physical environment significantly increases in each individual information household.

For thousands of years mankind has been preoccupied with the idea of making the communication of information simple and fast, possibly without human participation (couriers) in the delivery of information in order to get messages to their destination more rapidly and safely. Information flow based on message forwarding networks already appeared in ancient empires, but it is enough to go back to the 18th century to understand the formation of modern information and communication networks. In 1792 after the French Revolution Claude Chappe introduced his invention called the semaphore, or optical telegraph. This apparatus, regarded as the first telecommunication system, was based on the forwarding of visual signals between towers that were erected from 12 to 25 kilometres from each other. Each tower was fitted at the top with two-branched flags with seven positions on both sides, which were read by the operating staff in the next tower with telescopes. This system was able to transmit message fragments of two words per minute. Thus, it would have taken almost fifty minutes for an average text message (of 25 words) to be transmitted from Paris to Lille, which was 190 kilometres from it, along the first semaphore line.

In the course of about one hundred years the network of semaphore lines spread throughout the whole of France. Napoleon established a huge semaphore network and, among other things, kept his empire under control and organised the command of his army by means of these towers. Encouraged by the success of the French, similar networks were built in Great Britain, Germany, and in others countries, while Russia was linked with Poland in this way too.

1. Table: Cost of the semaphore and the electric telegraph at today's prices

Country	Semaphore line (120 miles)	Electric Telegraph line (120 miles)
Number of towers/network	15 towers (\$1,500,000)	Poles and wires (\$1,800,000)
Number of operators	at least 15 full-time operators (\$450,000 per year)	At least 6 full-time operators (\$180,000 per year)
Maximum period of use	10 hours per day	7 days/24 hours
Speed	2 words per minute	15 words per minute
Cost of sending 100 words	\$1.14 (at 10 % mark-up)	\$0.03809 (at 10 % mark-up)

Source: Wikipedia (Semaphore)

The real breakthrough in communications was the birth of the global communication channels spreading across the entire globe. The Electric Telegraph originated by Francisco de Salva, whose system, developed at the end of the 18th century, was able to transmit signals electronically. The further successful development of the system was carried out by American inventor Samuel Morse. The first trans-continental telegraph system connecting the east and west coasts was installed in the United States in the autumn of 1861. A few years later, on 27th July in 1866, the first trans-Atlantic telegraph network connecting the United States with Europe started its operation. By the end of the 20th century a global communication network spreading to every continent was established.

British historian Arnold J. Toynbee claims that mankind became connected in regard to information and communication (the creation of global interconnectivity) thanks to the international postal system. As he states, “as regards communication [...] world-society has existed for a century with its emergence dating back to the establishment of the international postal organisation in 1875.” In fact, Toynbee regarded the increase in correspondence as the most crucial factor in this process since its rate of growth exceeded the worrying increase in the size of the population (Toynbee, 1971: 385, quoted in Z. Karvalics, 2004: 39).

To sum up, globalisation brought about cultural, economic and political changes alike. In connection with the last, Armand Mattelart, a French theoretician on information society, remarks that the globalisation of politics was first recognised by American president John F. Kennedy when he stated that “in a sense the whole world can be regarded as an issue of interior policy” (Mattelart, 2001).

3. Time-space compression

The changes in space and time cannot be understood independently of social change. David Harvey uses this principle, among others, in his work when he analyses **time-space compression** in connection with post modernity. Harvey claims that social space gradually compresses into a “global village”, in which process telecommunication plays a prominent role. This is accompanied by an unprecedented acceleration of time (Harvey, 1990).

The transformation of global space is well indicated by the technical revolution in transport that started in the Middle Ages and with the development of aviation by the 1960s allowing even civilians to travel at a speed of nearly 700 m/h, i.e. more than 1,100 km/h, which amounts to a seventy-fold increase compared to 1500. Harvey’s data can be found below:

2. Table: Increase in the speed of means of transportation since 1500

Period (year)	Means of transportation	Speed (km per hour)
1500-1840	Horse-drawn carriage, sailing ship	16
1850-1930	Steam engine, steamboat	Steam engine: 104 Steam boat: 58
1950s	Propeller plane	483 - 644
1960s	Jet-propelled passenger plane	805 – 1127

Source: Harvey, 1990

It can be seen that innovations in infocommunication (e.g. the telegraph, the radio, the telephone) do away with earlier limitations and bridge physical distances, in many cases making personal presence unnecessary.

Furthermore, transportation technologies enable people to get from one place to another simply and fast if personal presence is necessary.

4. Interconnectivity

According to Castells, one of the greatest achievements brought about by the information society is the strengthening of global **interconnectivity** (Castells, 1996), that is, the system of mutual social relationships; for example, a fast motor highway network linking towns and cities enables interconnectivity as will in future high speed rail links.

Interconnectivity may be represented at a solely technological level too. The principle of interconnectivity in electronic communication means that in a network – which can be a sonic telephone connection or a network of computers built on digital data – a user has the opportunity to communicate regardless of whether he uses the networks of one or more service providers to establish the connection (Kariyawasam, 2001, quoted in Paliwala, 2006). In the case of the Internet, interconnectivity is provided through various services, for example by email).

It is interconnectivity that makes the Internet a global network. It is one of the fundamental principles of the network industry that the value of a network grows in direct proportion to the increase in the number of users that are connected to the network (Correa, 2001). This is especially true for telecommunication networks.⁷

⁷ This is well illustrated by the use of fax machines: the first buyer who purchased one fax machine got hold of a technology that he could not use for communication. He had to buy at least two devices that he then used between two companies' seats.

Use of space in the information society age

In this, our analysis of information society from a spatial perspective, the global society that emerged as a result of advanced communication and information technologies is characterised by interconnectivity and networks developing between physical spaces and people.

However, the network mode of operation and the transformation of physical space only characterises a limited aspect of the information society, which developed as a result of the complex processes that took place in the 20th and 21st centuries. In the exhilarating study which introduces the first chapter of his book *Theories of the Information Society*, Frank Webster presents five information society approaches with spatial structure theory being one of them (Webster, 1995). The British sociologist observes that in theories of spatial organisation the emergence of the information society is linked to the changing use of space and globalisation and the qualitative change that fundamentally differentiates the information society from society in the industrial age is attributed to same social and technical forces.

I. The revaluation of physical space

The development of the information society runs parallel with the diminishing part played by physical space. Engineer and informatician Nicholas Negroponte, the founder of the Media Lab research centre at MIT, drew a comparison between industrial society and the information society. As early as 1993-1998, he wrote about the movement of bits in his regular column in the American *Wired Magazine* promoting digital culture. By way of illustration (often quoted in scientific circles) he called the industrial society the **age of atoms**, while he denoted the information society the **age of bits**. His book published 1995 is in many ways a reiteration of his popular magazine articles. He writes about the change that is taking place as follows:

“The industrial age, very much an age of atoms, gave us the concept of mass production, with the economies that come from manufacturing with uniform and repetitious methods in any one given space and time. The information age, the age of computers, showed us the same economies of scale, but with less regard for space and time. The manufacturing of bits could happen anywhere, at any time, and, for example, move among the stock markets of New York, London, and Tokyo as if they were three adjacent machine tools.” (Negroponte, 1995)

Negroponte defined the difference between the two ages comparing the differences in the modes of production and in the type of goods produced. It is, therefore, no coincidence that he cites an example from the international money markets since this sector became international most rapidly with its operation having become network-based and entirely global.

It can be said that the effect of network society first manifests itself in the economic sector and within that in industries associated with financial and information management. Manuel Castells saw the effect of the network model in a similar way (Castells, 2006) when he states that network society initially appears in technology and economy. However, he goes beyond this and claims there is far more happening here since social and cultural effects also appear, albeit 10-15 years later; however, all social sub-systems had changed fundamentally by the end of the 20th century.

Negroponte says that development in the network society surpasses geographical boundaries entirely. Thus, the digital way of living depends less and less on where we are at a given time or what time our

watches show. He believes it is predictable that geographical places will be “moved” in the future and it will be possible to perform an operation from a distance, for example, thanks to the development of telecommunication and virtual reality.

In medical science, as in other areas, the development of information and communication technologies has greatly contributed to lifting more and more limitations that result from physical distance. As an example, the Republic of Mali in West Africa, a former French colony, has only one medical university, operating in the capital. Therefore, training and consultation programmes provided through the Internet seemed to be the best solution for the country. The African state, twice the size of France, established the “eHealth in Africa” network with professional support from the Hospital of Geneva University. Later, several other African countries joined the project. Adapting to the reality of small bandwidth, the programme provides effective assistance (video materials for learning, consultation opportunities, knowledge base) for young doctors working in the disadvantaged rural areas too (The RAFT Network, 2007).

2. Global production and use of space

The development of information technologies and the process of globalisation go hand in hand. Globalisation is in fact not simply about bridging geographical distance but far more than that. Anthony Giddens explains globalisation as the result of a process of deepening social ties that connect previously separate communities (Giddens, 1997).

Social processes have pointed towards globalisation ever since the beginnings of mankind. The Global Scenario Group, founded by the Stockholm Environment Institute, presents this change in four stages:

3. Table: Stages of globalisation throughout the history of mankind

	Stone age	Early civilisations	Modernity	Global age
Organisation	Tribes/village	City state/kingdom	Nation state	Global governance
Economy	Hunting and gathering	Agriculture	Industrial production	Globalisation
Communication	Language	Writing	Printing	Internet

Source: Global Scenario Group, 2002

It is clear that in addition to the economy, the organisation of communities, the political system and the method of communication also felt the same forces of change over time. Processes of standardisation and compression affected all three areas: local social and economic institutions were gradually replaced by increasingly supranational and global systems.

Economic change is compelled by multinationals gaining ground. These companies are often present on more than one continent at one time and in many cases production, management, sales as well as research and development functions are shared between the various branches. This type of production and sales method that encompasses the entire globe could not have happened without the explosion of information and communication technology development.

According to American economist and sociologist Saskia Sassen technological development, economic transformation and the globalisation process – in a broader sense – have led to a profound change in spatial structure (Sassen, 2000). Exploring the social impact of information technologies she argues that depending on the mode of production companies have varying degrees of freedom in deciding about the physical location of

their business functions. Having reviewed the practice of the past ten years she differentiated three types of globally active companies.

Firstly, there are those companies that deal with products that are mass-produced with standardised methods. They have a far greater degree of freedom in choosing their production sites than before. In regard to establishing the production chain the role played by geographical distance is diminishing, typical examples of which include data entry and simple assembly work, which are no longer specific to big cities. In such cases, therefore, labour cost is the most important factor when the decision about location is made. These types of companies do not necessarily set up their centre in a big city but often in suburbs, industrial parks or the environs of small towns.

The second major type based on a similar pattern are those big companies with a vested interest in global production that need to carry out more complex organisational and management tasks than the companies in the first category. They often use special network services in order to perform these tasks and outsource some of their managerial tasks, thus granting themselves more freedom to choose the location of their central offices.

The third type of company includes highly specialised businesses providing network services. They maintain intensive connections with other companies and the provision of the information flow for others is their special priority. Companies providing financial services belong to this type for example. Sassen noticed that these companies are more place-specific than it could be assumed at first based on the mobility associated with their activity and the products they produce.

Sassen says that choosing a location has remained an important factor even in today's global and digital economy. However, the old schemes and patterns of using space are no longer valid. While centres used to be typically located in big cities, and within that in business centres, today companies have appeared which have management tasks shared between centres in different locations through new communication networks in addition to companies with one centre. The centres that are geographically separate are linked up into a network. Sassen claims that along with the processes of globalisation taking place some locations gain special significance and certain big cities become global cities. This is the reason why some international giants set up their centres in places like London, New York, Sydney and Hong Kong.

From cyberspace to virtual reality

The term cyberspace was coined by science fiction author William Gibson from the words cybernetics and space. He first used the term in his short story entitled “*Burning Chrome*”, published in 1982, and it was made known worldwide by his famous novel *Neuromancer* (Stanovsky, 2004). Gibson uses cyberspace as the visual manifestation of computer-stimulated reality, or the graphic representation of data flowing through computer networks. He explains the essence of cyberspace in *Neuromancer* in the following way:

“Cyberspace. A consensual hallucination experienced daily by billions of legitimate operators, in every nation, by children being taught mathematical concepts. [...] A graphic representation of data abstracted from banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding...”
(Gibson, 1984)

The concept of cyberspace, as Hayles points out, was born out of nowhere. On the one hand, Gibson reacted to those technological and social changes that shaped people’s worldview in the 1980s and 1990s (Hayles, 1996), and on the other hand he revisited the research that had been carried out in cybernetics in the preceding decades.⁸

In *Cyberspace Handbook* (Whittaker, 2004) three geographies of cyberspace are distinguished, based on Manuel Castells and Matthew Zook. The focus of technical geography is basic infrastructure, i.e. the network enabling the flow of information. The geography that focuses on a users’ spatial position reflects upon the place they occupied in the physical or social network. Lastly, economic geography deals with production linked to information technology, such as the activities of Silicon Valley or those of the electronics factories in Southern Asia.

The first successful application of virtual reality can be found in the American army and the Americans space research institute NASA (Stanovsky, 2004). The objective of military innovations was to provide through ‘simulations’ as realistic as possible training for pilots. The next phase of virtual reality innovations was in the entertainment industry, where the objective was again to experience a true-to-life sensation, not for learning but for leisure purposes. Stanovsky quotes the early *Cinerama* (wide screen film recorded with three cameras and projected with three projectors) of the 1950’s as being one of the roots of VR, alongside development of the stereo sound and experimental 3D films in the struggle to resist the effects of TV on the film industry.

However, virtual reality offers more than just simulation and a new form of entertainment: in many cases new community spaces can be set up with its help, where users get in touch with each other in a computer-generated simulated environment. This virtual space can equally be based on imaginary locations and can be the exact representation of real places. Virtual reality may also be based on a model created with (three dimensional) computer graphics. Furthermore, a text description of virtual spaces, such as the description of places in an imaginary city that users can enter, may also be regarded as virtual reality.

Multiplayer games enacted in virtual spaces are another important example among the computerised versions. The MUD (Multi User Dungeon) is a combination of role-playing games, online chat rooms and computer games. The largest free online community encyclopaedia Wikipedia devotes several entries to MUDs. Inter-

⁸ Cybernetics as a scientific term became known as the umbrella term used for new interdisciplinary research that appeared in the 1940s. Contrary to widespread belief, cybernetics is not directly linked to computer science since its focus of interest is how mechanical/ digital devices and living organisms process information and how they react to it (see e.g. Wiener, 1948).

estingly, the history of online games can actually be traced back to the academic sphere since the first game was launched at the University of Essex in England at the end of the 1970s.

In his study detailing MUDs (Curtis, 1992), Pavel Curtis, one of the former leading inventors at Xerox's research centre in Palo Alto, points out that in online role-playing games the players communicate with each other in real time and the customary forms of communication are valid in the network. As he says, MUDs are software allowing access for many users to a special database with the help of some kind of network during which the connection can be realised through a telephone call and the internet. The shared database contains the "rooms" of the game, the users' data and other information. According to Curtis, MUD belongs to virtual reality because it is an electronic space that users can visit.

Today multi-player online role-playing games operate through graphic interfaces, in online visual worlds. MMORPGs (Massively Multiplayer Online Role-playing Game) often referred to as the new generation MUDs, have a global membership of millions of users. MMORPGs have created special community spaces with some of them having their own economic rules and the most important resources are often sold for real dollars instead of virtual currency.⁹

Players are offered more advanced versions of virtual reality while at the same time technology is utilised in a growing number of other areas, too. Education was an important area of use at the very start. In some experimental projects conducted in the United States in the 1990s virtual reality was introduced to schools. This technology is employed in medical science. For example, phobias linked to fear of depth or heights are cured in virtual environments, but the technology has also been used in the psychological treatment of soldiers returning from combat in Iraq. Furthermore, several uses of VR are known in the areas of commerce, e-administration services, medical science and those forms of fine arts that are open to technological change.

⁹ Two of the most popular MMORPGs are Second Life (<http://www.secondlife.com>) and World of Warcraft (<http://www.worldofwarcraft.com>).

Summary

When exploring physical space we can see how in the past period of great geographical explorations the world seemed to expand. As a result of urbanisation the majority of the Earth's population now lives in towns and cities, and it is as a consequence of this urbanisation that the degree of interconnectivity has increased. Today those parts of the world that are situated at great distances from one another are not so isolated since they may mutually exert influence on one another economically, culturally and politically through network technology

On the other hand, the development of transport and the rapidly spreading communication technologies have also led to a shrinking of the world which has had the same effect as diminished physical distance. A good example of this is that the speed of means of mass transportation increased 70 fold between the Middle Ages and the second half of the 20th century.

Starting from the end of the 18th century, communication networks gradually extended to cover the entire globe and transcontinental lines appeared by the 21st century. At the same time, the costs of communication radically decreased and interconnectivity further enhanced the processes of globalisation.

The use of space in the information age has affected the strategies employed by international companies, worldwide production and sales methods and the bases of the global division of labour. With the development of the network society the role played by physical space decreased, and as Negroponte also pointed out, development surpasses geographical boundaries.

Cyberspace, the conceptual antecedents of virtual reality and its main area of use, must be mentioned first in connection with the new forms of the use of space. Multiplayer computer games, which appeared in the late 1970s, the experiments of the military industry and innovations in the entertainment industry laid down the foundations for VR development.

Revision questions

1. Negroponte called industrial society the age of atoms. What metaphor did he use to describe the information society and why?
2. In which century were the first transcontinental communication networks set up (electric telegraph, international postal network)?
3. Cities exceeding what size of population can be called megalopolises? List three examples from three different continents.
4. What technological developments have contributed to diminish the role of physical distance?
5. Who coined the term cyberspace? What does the term mean?
6. Virtual reality and three-dimensional effects are not only used in the entertainment industry. What practical forms of application can you name in connection with VR?

Key terms

Age of atoms, age of bits: A descriptive metaphor used by Nicholas Negroponte, according to which industrial societies are determined by the physical environment (raw materials, material goods), in other words atoms, while information society is determined by the flow of digital information, i.e. the movement of bits.

Cyberspace: The term cyberspace is linked to William Gibson's book *Neuromancer*, published in 1984, and refers to computer networks and information resources accessible through them. Cyberspace was often used at the end of the 1990s as a synonym for the Internet.

Globalisation: refers to the increased interdependence and mutually exerted influence between countries and between human communities on a global level, which shapes economic, cultural and political subsystems.

Interconnectivity: On the one hand, the concept that, within dynamic systems such as biological entities, economic systems or societies, the changes between connecting subsystems mutually affect one another; on the other hand, the development of mutually connected information and communication systems.

Time-space compression: A term coined by David Harvey. The development of transportation technology and the increasing role of the media bring about a decrease in the importance of physical distances and the time needed to bridge them.

Virtual reality: Real or imaginary worlds simulated by computers. The term can be used for graphic- and text-based computer-generated worlds. Virtual reality is closely linked with the development of 3D computer representation; special software and hardware is often used to achieve 3D effects (e.g. VR glasses).

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