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Antti Kasvio

What Information Society?

A vision and its realisation

During the early 1990s many leading politicians in advanced industrial countries became thrilled by visions of a new information technology revolution and its possible societal consequences. Already during the 1980s there had been a lot of talk about the so-called microprocessor revolution and personal computers had spread quickly, both within the workplace and among households. More advanced generations of computers and software continued to enter the market with what seemed to be accelerating speed. At the same time, people had begun to talk about new kinds of information superhighways, and the popularity of the world wide web was exploding. A new communications revolution seemed to be in the making, and it would evidently have a significant impact upon the everyday lives of citizens. This revolution also seemed to provide the advanced industrial countries with an opportunity to restore their competitiveness and to generate new economic growth at a time when they were on the defensive in many traditional sectors. Articles in *Wired* magazine and books like Bill Gates' *The Road Ahead* (1995), Nicholas Negroponte's *Being Digital* (1995) and Frances Cairncross' *Death of Distance* (1997) were effectively spreading the message of this new revolution.

Originally, the significance of this new revolution was invented by a few innovation economists. For instance, Chris Freeman and Luc Soete saw that digital signal processing had developed into a common platform for a wide range of different applications, and this observation led them to write about a

major technological breakthrough that would lead towards the development of a whole new technological paradigm (Freeman & Soete 1994). Terms like ‘digital revolution’, ‘new information and communication technology’ and ‘media convergence’ soon became widely used in different contexts. From the outset it was considered evident that the main economic benefits of the new ICTs would not be gained in the production of different information technological devices but rather in the development of new software and applications for these technologies.

One could already see the political significance of this new revolution in the 1992 presidential elections in the United States when both the Democratic and Republican candidates invited technology visionaries into their campaign teams. A little later the so-called National Information Infrastructure initiative became a central part of the Clinton-Gore governmental agenda (Clinton & Gore 1992, 10). In western Europe the building of new information highways was included as an important element of the growth strategy formulated in the EU Commission White Paper on growth, competitiveness and employment that was published in December 1993 (EU Commission 1993). Soon thereafter, advanced industrial countries started a large number of programmes and initiatives in order to promote the spread and use of new information and communication technologies. In addition, the G7 group of advanced industrial countries launched its own action plan in order to promote the development of information society on a worldwide scale (G7 Summit 1994). The term ‘information society’ became widely used, particularly in the various policy documents published by the European Union (EU Commission 1994). With this terminological choice the European authorities wanted to stress the overall character of those changes that would take place as a consequence of the information technology revolution, whereas more technological

terms – like ‘information highway’ – were preferred in North American discussions.

The visions of a new industrial revolution gained more credibility with the emergence of a new generation of so-called dotcom enterprises, some of which were able to reach amazing rates of growth. It was not long before people began talking about a new economy that would transform the advanced industrial economies. In the space of a few years the new economy evolved from a small number of pioneering enterprises into the main engine of the U.S. national economy. Corporations and private households alike were able to multiply their property by investing in technology stocks that were growing at an unprecedented speed. The pace of change was much more modest in western Europe and Japan, but determined efforts were made in both these societies to narrow the gap that had emerged between them and the United States. One can, thus, very well say that, during the 1990s, information society became the grand societal project of advanced industrial countries in the same way that the building of a modern welfare state had dominated their social and economic policies after the Second World War. Even if the new information and communication technologies seemed – particularly in the initial stages of their adoption – to be mainly concentrated in the advanced industrial countries, it was expected that they would soon be spreading all over the world. Thus, with the right policies it would become possible to narrow the global digital divides, at least to some extent.

Developments in social science

Academic social science did not necessarily share the enthusiasm that many other actors had for the idea of ‘information society’ as a new type of society that would emerge from the information technology revolution. Social scientists have traditionally been

rather sceptical about talk of major societal changes being caused by technological revolutions. They have wanted to avoid being caught in the trap of technological determinism, and have wanted to make a clear distinction between real societal change processes and rhetorical declarations about changes that are only expected to occur. The concept of information society was originally introduced into social scientific discussion by futurological authors during the late 1970s and early 1980s, but it did not have any clear theoretical status. Thus, until the mid-1990s, most social scientific commentaries of the information society discourse were quite critical towards these ideas (see e.g. Webster 1995; Kumar 1995; Duff 2000), and much more attention was paid to other change processes going on within the advanced industrial societies. There were lively discussions about the post-Fordist restructuring of production, changes in the existing welfare state regimes, new trends in gender identities, and cultural postmodernism, for example. Gradually, however, the spread of new information and communication technologies had reached dimensions that prompted some social scientists to think that perhaps something important was indeed happening.

The 'Information Age' trilogy published by Manuel Castells in 1996–97 transformed the intellectual landscape of modern social science. In this book Castells presents a carefully articulated and complex analysis of the 'informational' stage of modern capitalism (Castells 1996–7). The key message of this book is that the advanced industrial societies are indeed entering a qualitatively new stage in their historical development and that these changes are driven by globalisation and technical change. The changes could be seen within the economy, with globally networked enterprises as key actors, in the world of work, in the spatial organisation of modern societies, in the area of culture, in politics, in the role of the state and in the ways in which people are building their personal identities. Anthony Giddens

immediately hailed the book as a modern classic (Giddens 1996) and, since its appearance, several social scientists have started to systematically study the role of new information and communication technologies in the functioning of modern societies.

As a societal change project, information society reached its climax at the end of the 1990s. By that time it had become evident that the growth of the new economy had significantly contributed to the exceptionally long boom and rapid expansion of the stock markets in the United States. All enterprises wanted to reinvent themselves to be seen as real information-age companies. If clear evidence of the productivity-increasing effects of ICTs had previously been difficult to find, towards the end of the decade a clear upward trend became visible in the national economic statistics. It seemed that the advanced industrial economies might be approaching a new era of sustained, high economic growth and increasing affluence, and that perhaps the traditional boom-bust cycles would also be passing into history. Politically, the world seemed to be moving towards liberal democracy, a process that was supported by the free flow of information within the worldwide electronic networks. It was expected that the world would perhaps also learn to solve international conflicts in a more coordinated manner so that classic wars between nation-states could be avoided. And it was thought that the development of modern natural science would open up new possibilities to cure illnesses and provide citizens with the opportunity to live longer and happier lives (see e.g. Schwartz & Leyden 1997).

Facing new realities

The entire economic and political landscape in advanced industrial countries changed dramatically during the first years of the 21st century. Certain promises connected to the new

information and communication technologies were not fulfilled, the financial bubble built around technology stocks burst and the world economy glided into a new recession. The advanced industrial economies have since recovered from the recession, but their economic growth has been based on very traditional factors, in particular on the consumption behaviour of U.S. households. ICT companies have been forced to adjust their activities to the same limitations as the more traditional companies, and the term 'new economy' has virtually disappeared from economic literature.

Almost equally strong changes have taken place in the area of politics. The earlier democratic trends have given way to the rise of new authoritarian regimes in several countries in various parts of the world. The United States has strengthened its position as the world's leading economic and military power and has shown its readiness to unilaterally use force in promoting its own national interests. Tensions between western countries and radical Islamism have become aggravated, especially after the Al Qaeda terrorist attack in September 2001, and, instead of creating mutual understanding, the worldwide spread of information may be offering people further reasons to disagree with each other (Kaplan 2002, 5–6). New power struggles have emerged between countries over the control of the world's critical energy resources. Conservative forces are creating new barriers in the development of science, and many people have doubts about whether the potential of science and technology is really used for the benefit of mankind. The prevailing patterns of growth are connected with serious ecological risks, but there is little potential for finding real solutions.

These changes in conditions have led to certain reassessments in social science as well. It has been asked whether social scientists were also carried away by the hyped expectations that led so many investors and policymakers astray during the 1990s.

Rather sharp criticisms have been presented, for instance with regard to the ‘phantasmagories’ of Manuel Castells (Heise 2002). Frank Webster – the British sociologist who during the 1990s wrote the most authoritative review of the existing information society theories – has posed the question of whether we can really interpret certain quantitative trends as leading towards qualitative changes in the basic institutional arrangements of modern societies. His own stand is hesitant and he believes that it is up to us to decide whether we want to use the term ‘information society’ to describe the current stage in the development of modern societies (Webster 2002, 267).

At the same, Webster makes an important qualification. While the term ‘information society’ has been used to refer both to the spread and use of new information and communication technologies and to the growing knowledge-intensity of our activities, Webster suggests that the increasing significance of abstract theoretical knowledge is the more important trend. In this respect we can talk about ‘information societies’ and ‘knowledge societies’ as synonyms, and the new information and communication technologies gain importance as technologies that significantly increase our knowledge-processing capacities. This solution brings Webster closer to the thinking of such authors as Daniel Bell (1973), Peter F. Drucker (1969) and Nico Stehr (1994) and those neoinstitutional theorists of economic growth who, during the 1990s, developed their ideas about knowledge-based economy (Webster 2002a, 263–273; see also Webster 2002b).

Manuel Castells’ new theoretical position

Manuel Castells has also developed his ideas further (Castells 2004), but he has been moving in an entirely different direction. During 1996–97 Castells gave his trilogy a title ‘Information

Age' and, although he preferred to talk about an 'informational society', he did not actually reject being identified as a theorist of information society (see Castells 1996, 21). More recently, however, he has wanted to distance himself clearly from the earlier ideas of information or knowledge society. According to Castells, any attempt to analyse modern societies in these terms is 'an empirical and theoretical error' (Castells 2004, 7). The main reason for this is that information and knowledge have always been key factors in achieving power and wealth in all societies. Castells adds that 'in broader terms of social evolution, the notion of the information society reproduces the myth of the historical continuum from nomadic to agricultural societies, then to industrial society, to culminate in the apogee, obviously in our time, of the information society. Human history is then assimilated to the long march of progress under the guidance of reason (with occasional prayers to God just in case), as exemplified by the wonders of computers, clean toilets, and smart weapons. No conflict, no contradiction, just technologically predetermined change, and resistance to change. And since resistance to reason is irrational, it must be obliterated to clear the shining path toward our promised star' (op.cit., 40).

Evidently Castells wants to distinguish himself from the abstract universal historical theoretisations according to which all societies would be moving from agricultural to industrial and from industrial to information society as a unilinear process driven by the objective laws of scientific, technical and human progress. But this does not mean that Castells would have abolished the idea of analysing technology as the key moving force of societal development. Neither does it mean that he would have lost his belief in the significance of the ongoing information technology revolution. On the contrary, his main thesis is that modern societies have entered into a new type of society, the network society, and that this development has become possible because of

the development of electronic information and communication technologies (Castells 2004, 6). Indeed, he writes that ‘on the basis of a new technological paradigm (informationalism) a new social structure has emerged, a structure made up of electronic communication technologies – powered, social networks. . . . Therefore, in my view, we must let the notion of an information society or of a knowledge society wither, and replace it with the concept of network society’ (Castells 2004, 41).

Castells defines the network society as ‘a society whose structure is made of networks powered by microelectronics-based information and communication technologies’. A network is ‘a set of interconnected nodes’. Networks have no centres, only nodes which may be of varying relevance for the network. All nodes are not necessary for the network’s performance, and when nodes ‘become redundant or useless, networks tend to reconfigure themselves, deleting some nodes, and adding new ones. Nodes only exist and function as components of networks. The network is the unit, not the node’ (Castells 2004, 3). The existence of networks is not a new phenomenon; in fact, in line with authors like Fritjof Capra (2002) or Mark C. Taylor (2001), Castells finds that networks ‘constitute the fundamental pattern of life, of all kinds of life’ (op.cit., 4). He cites those who point out that networks have had a significant role even in ancient societies. The superiority of networks is based mainly upon their high levels of flexibility, scalability and survivability (5–6). However, the victory of networks over vertical-hierarchical organisations has actually become substantiated together with the development of modern information and communication technologies. The main reason for this is that the network form of organisation has always had certain material limits to overcome, and these limits have essentially been linked to the technologies that have been available at that time (5).

If we compare these statements to the comments that Castells presented in 1996 about the concept of network society, we can see a clear shift of emphasis. Even if he already then preferred the term ‘network society’ as the most adequate description of the character of modern societies, he pointed out that certain components – ‘such as social movements or the state’ – exhibit features that go beyond the networking logic and, therefore, that this term does not necessarily exhaust all the meaning of the informational society (Castells 1996, 21). More recently, Castells has taken the position that the network metaphor can be used to analyse and to explain all the key processes going on within modern societies, ranging from the competitive strategies of modern enterprises to the ‘swarming’ tactics of modern high-technology warfare, the functioning of the media and the operational logic of different kinds of social movements.

Despite these kinds of reconceptualisations, most of the actual substance of Castells’ description of the modern network society – including his analysis of ‘informationalism’ as a new technological paradigm, the rise of the network enterprise, the increasing significance of the media, the development of new power structures, processes of spatial restructuring and the emergence of new timeless time – can be regarded as a recapitulation of those theses that Castells has already presented in his earlier writings. We can, however, see that Castells makes a special effort to avoid potential accusations of technological determinism. He emphasises the contingent character of the information technology revolution, which has been an outcome of quite specific historical conditions (Castells 2004, 14–22), and he also stresses that the resulting social structures ‘always express, in a contradictory and conflictive pattern, the interests, values, and projects of the actors who produce the structure while being conditioned by it’ (24). These kinds of specifications cannot be found in the standard visions of unilateral information society.

Another important element in Castells' analysis is the active search for counter-trends to those ways in which the global network society is currently developing. He postulates that the processes of market liberalisation that led to the post-Fordist restructuring of production in the late 1970s and early 1980s would have had some real alternatives (16–17). He also points out that the question of what constitutes value in modern network societies is basically still open. Even if, according to the logic of capital accumulation, money is the measure of everything, with a different frame 'ideas, or specific sets of ideas, could assert themselves as the truly supreme value (such as preserving our planet, our species)' (25). In a more pronounced manner, Castells thematises the issues of resistance in his analysis of power and counter-power within the network society (34–36) and he evidently has certain expectations about the emancipatory powers of grassrootsing which, 'instead of enclosing meaning and functions in the programs of the networks', could 'provide material support for the global connection of local experience' (38). In his cultural analysis Castells sketches an opposition between 'the diffusion of the capitalist mind through the power exercised in global networks' and a process by which 'conscious social actors of multiple origins bring to others their resources and beliefs, expecting in return to receive the same, and even more: sharing a diverse world, and thus ending the ancestral fear of the other' (40).

Critical reflections

Altogether Castells has presented a very bold theoretical thesis which is undoubtedly interesting but at the same time also highly problematic. For instance, the way in which Castells criticises theories of information or knowledge society is not very coherent with regard to those arguments which he presents in favour of his

own network society concept. He writes that it is not sensible to talk about a transition to information society because all societies are based upon information. This is undoubtedly true in the sense that a society cannot exist without at least some kind of common consciousness. But what has actually been presented in recent discussions is that there has been a qualitative shift in the knowledge-producing capacity of modern societies, and therefore all their activities have become much more knowledge-intensive than ever before. Castells writes that the most important new feature of modern societies is their increasing reliance upon networks. At the same time, Castells postulates in another passus that all historical societies have been based on networks and that, in general, there cannot be life without networks. Why is postulating A a logical error while postulating B on the same grounds is not?

It is also worthwhile to ask to what extent Castells has been able to avoid the trap of technological determinism. Although he stresses the historically and culturally contingent character of technological innovation processes, he seems to have a very strong evolutionary vision about modern societies transforming into increasingly complex adaptive systems. This rather straightforward vision leads Castells to say that the structures of modern societies are based upon or powered by the new electronic information and communication technologies. Such a thesis can be criticised by pointing out that social structures tend to emerge through complex historical processes in which technological factors may play a certain role, but one that should not be exaggerated. Similar criticisms can be presented concerning the author's willingness to apply the network metaphor to everything that happens in modern societies. Doesn't this manifest a fairly deterministic stance? It assumes that the various institutions do not have any other choice than to start functioning in a networking mode because it is technically most effective. In order

to satisfy that requirement, they must base their activities upon new information and communication technologies.

From a cognitive perspective, perhaps the most crucial question is: what do we actually get from the thesis which says that in modern societies everything happens through networking? Networks do indeed function under different rules than centralised bureaucracies. But the network metaphor is a very general one, and the more widely we use it, the less it can tell us about the specific features of particular institutions or processes. Let us take for instance the functioning of modern economic institutions. We can postulate a thesis according to which we are moving towards a global network economy. But what does it actually mean? Modern economies are undoubtedly functioning as complex networks in which single nodes are organised as private enterprises that interact with each other through markets. The markets have developed into a complex, decentralised and self-programming system which relies upon the price mechanism. We have a wide body of economic literature that attempts to analyse this system's functioning. Adding the label 'network' to these analyses or interpreting the economy's functioning according to the networking logic does not, in itself, increase our understanding about economic phenomena unless this process leads to some substantially new hypotheses or observations about today's economic phenomena.

One interesting feature of Castells' analysis is that he does not discuss extensively those qualitatively new trends that have been observed after the burst of the financial bubble and the declaration of war against terrorism. In his perspective the most important developments seem to have taken place during the 1990s, with its excesses having simply been a temporary deviation caused by 'the fantasies of business consultants and futurologists who forgot that the key role of the Internet is to power the real economy' (42). Nothing seems to have shaken Castell's reliance

upon 'informationalism' as a new technological paradigm that will one day transform the whole world.

This means that despite Manuel Castell's enormous achievements in modern social science his analysis does not necessarily serve, any longer, as such an adequate and up-to-date 'analysis of the present' as the Information Age trilogy did when it first came out. Castells does not necessarily touch upon those questions that many people consider most troubling or politically relevant at the current stage of societal development. Instead, the continuation of some old themes is complemented in his newer writings with very broad civilisatory reflections, a number of more or less hitting commentaries about concrete issues and elements of social criticism that are interesting in their own right but do not necessarily present a real challenge to the present course of affairs.

Is the information society project still alive?

It is quite evident that building the information society is no longer a particularly hot topic in the advanced industrial countries. Officially, the European Union is still firmly committed to promoting the development of information society and a new world summit has convened in order to discuss this issue (ITU 2004), but leading politicians are not trying to increase their support by presenting themselves as the real pioneers of the information age. For example, if one tries to find out what was said about the topics of 'information society' or 'new economy' in the autumn 2004 US presidential debates, the search engine responds politely that 'we're sorry, your search did not find any matches' (Commission on Presidential Debates 2004). One consequence of this is that not very many heads of state did actually participate in the Tunis World Summit in November 2005.

The main reason for such a change in atmosphere is that the political actors have a number of more relevant issues to deal with. Among these are the questions of economic growth and employment in advanced industrial countries at a time when many companies are relocating their operations to China and India. Populations are aging, and the existing systems of taxation and social security need to be reformed. There are serious security issues to tackle, the war on terrorism is continuing, and energy prices are increasing. Of course, the information technology revolution is still seen as an important issue, the ICT industry is recognised as a very central cluster and the new information and communication technologies can be used to boost productivity within the public sector. On the other hand, IT investments have gone down, some applications have led to disappointments, many people are still angry about having lost money after investing in technology stocks, and people no longer believe that the information technology revolution will lead to prosperity just around the corner. Politicians do not necessarily want to invest too much of their energy in processes that are going on anyway or in raising issues that do not bring them new voters.

At the same time we can see that in academic social science the previous, somewhat coherent information society discourse has become much more fragmented. Some academics refuse to talk about the western countries being in the midst of some kind of an epochal transformation; according to them, postulates about such fundamental changes have, for the most part, been little more than a myth (see e.g. Salvaggio 1989; Garnham 2002). Others are readier to consider the possibility that such a transformation is really taking place, but they are not able to reach an agreement about its key driving forces or about those terms with which the new society ought to be described. There is a strand of research that is mainly interested in the societal consequences of new information and communication

technologies, with Manuel Castells as one of the leading figures, but there is also another group of authors – including Frank Webster – who stress the significance of knowledge as the most important factor of societal change. One consequence of this development is that the word ‘knowledge society’ is nowadays increasingly used to replace the earlier, almost universally used term ‘information society’. Instead of one information society discourse we now have two fairly different theoretical research programmes, even if these programmes share certain common areas of interest.

The current stage of the information technology revolution

Before rushing to further conclusions about the present theoretical situation, it is useful to analyse the way in which the information technology revolution itself is currently proceeding. The pessimists tend to say that the really radical breakthroughs – like the invention of microprocessors, the development of personal computers, the introduction of mobile telephony and the Internet – have already happened, that many of the key technologies are maturing, and that the miniaturisation of processors as well as the increase in their computing powers are gradually approaching physical limits which cannot be overcome without adopting entirely different technologies. Thus, future developments will be mainly incremental in character and the most essential of their societal consequences will have already been experienced. We have already been able to see, for instance, that increasing Internet usage has not in any significant way transformed the ways in which organisations function. Neither has it led to any fundamental changes in the ways in which citizens conduct their everyday lives.

A certain degree of modesty is undoubtedly welcome after all those hyped predictions of the late 1990s. However, it is also important to pay attention to the fact that despite certain negative trends – like the declining levels of IT investments in some countries – the information technology revolution is still continuing and certain technologies are spreading worldwide even more rapidly than could be expected a few years ago. The most spectacular phenomenon has undoubtedly been the pace at which mobile telephones have been taken into use in all parts of the world. It is nowadays estimated that the number of mobile phone users would increase to two billion by 2006 or 2007. This process has taken place relatively soon after television became a worldwide media. As a consequence of these developments, an essential part of the world population has entirely new possibilities to keep themselves informed about what is going on elsewhere and to connect with other people.

At the same time, the use of new information and communication technologies has become an organic part of people's everyday activities within the advanced industrial societies. Gradually the emphasis is moving towards more advanced solutions, as can be seen for instance in the fast spread of broadband connections, the introduction of the next generation mobile phones, the development of new enterprise solutions and in an increasing number of 'hotspots' that are offering people in those locations the possibility to connect to wireless broadband networks. These developments are being driven forward by a fast deflation of the prices of different kinds of information technological devices. Meanwhile, the properties of these devices are also improving from one generation to the next.

One consequence of these kinds of developments has been the observation that ICT has not lost its significance as an important and dynamic force of growth in advanced industrial economies. Recent studies have, as a matter of fact, rather

convincingly demonstrated that the advanced industrial countries can perhaps best improve their productivity and strengthen the overall competitiveness of their economies by increasing their investments to ICT and by offering good growth possibilities for the ICT industry (see e.g. Jorgenson 2004; EU Commission 2004, 155–188; Estevão 2004; PricewaterhouseCoopers 2004).

If we look a little further into the future we can see that, despite more sceptical expectations, the processing power of integrated circuits is increasing roughly according to Moore's law, which will probably continue for at least some time into the future. We will, therefore, relatively soon be approaching a situation in which increasingly intelligent applications are embedded into our everyday surroundings, enabling us to use a broad variety of services in a very natural manner without having to sit at a computer or switch on other electronic devices. We will also learn to take for granted the possibility to connect into different networks wherever we happen to be, whatever we are doing. We are not necessarily so interested in which specific technologies are used in order to establish the required connections; our main attention will be directed to those substantial activities in which we are using these possibilities.

Various terms have been introduced in recent times to analyse these kinds of prospects. For instance, the advisory group of the EU IST programme has been using the term 'ambient intelligence' (see e.g. Ducatel et al. 2001), whereas the term 'ubiquitous computing' has been more widely used in the United States, in Japan and in South Korea. The main message of the different scenarios is, however, basically the same. It is assumed that the increasing computing powers that are surrounding us will significantly transform the ways in which we conduct our everyday activities. Soon we may also be approaching a stage in which the information processing powers of modern computers will equal that of the human brain (Kurzweil 1999).

From information to knowledge society

On the basis of these kinds of observations we can conclude that the story of the information technology revolution is far from being over. It is important to pay attention to the fact that the increasing information processing capacities made possible by modern computers has also opened the gates to many other scientific and technological breakthroughs, among which the mapping out of the human genome has undoubtedly been one of the most important. We can add to this the recent advances that have been made in areas such as biotechnology, new materials, nanotechnology, and others.

This brings us rather naturally to the next conclusion. The development of new information and communication technologies has been important simply because these technologies have offered us the possibility of handling increasing amounts of information. For instance, the rapid worldwide spread of mobile telephones is, in itself, a very important phenomenon, but the purchase of a mobile phone is also merely the first step in the transition into a new information age. Much more important change processes will be launched when people living in widely different cultures and physical environments start using these devices in order to solve all kinds of problems they face in their everyday lives. This will certainly lead to many kinds of social innovations which will have many kinds of consequences for the future development of our societies.

Some economists have emphasised the crucial significance of ideas in the development of modern economies (see e.g. Jones 2004). During the early 1990s the representatives of the so-called new growth theory were able to convincingly show how the advanced industrial societies have been moving towards increasingly knowledge-intensive patterns of growth (e.g. OECD 1996). In the mid-1990s this discourse receded somewhat to the

background as the attention of many economists was focused on analysing the so-called new economy and the interrelations between ICT investments and productivity growth. Now it has become possible to rehabilitate the idea that the production of knowledge is probably the most crucial factor behind future productivity increases. We can also see that there are no absolute limits to those productivity increases that can be attained through better knowledge. In this respect we are only at the very beginning of the actual productivity revolution that will, in future, proceed on a worldwide scale. The traditional knowledge institutions – that is the educational and scientific institutions – will probably have an important role in this transformation (e.g. Roco & Bainbridge 2004; Garreau 2004)

This brings us back to the demarcation that has in recent discussions emerged between the different kinds of information society discourses: those stressing the significance of the information technology revolution and those looking at the development of modern information societies mainly in the sense of a knowledge society. We see no reasons to build artificial divisions between these two perspectives, which could rather be seen as complementary (which was also how Manuel Castells approached the topic in his Information Age trilogy). However, if we have to choose whether we want to analyse the transformation of modern societies either in terms of particular technologies or in terms of their increasing knowledge intensity, our choice is definitely in favour of the latter approach.

Knowledge for what?

Benjamin Franklin wrote to his friend in 1780 that the rapid progress of science ‘occasions my regretting sometimes that I was born too soon. It is impossible to imagine the height to which may be carried, in a thousand years, the power of man

over matter. We may perhaps learn to deprive large masses of their gravity, and give them absolute levity, for the sake of easy transport. Agriculture may diminish its labor and double its produce; all diseases may by sure means be prevented or cured, not excepting even that of old age, and our lives lengthened at pleasure even beyond the antediluvian standard. O that moral science were in as fair a way of improvement, that men would cease to be wolves to one another, and that human beings would at length learn what they now improperly call humanity' (letter to Joseph Priestley, February 8, cit. Whéen 2004, 1).

Today we can see that many of the scientific achievements envisioned by Franklin have come true in a much shorter period of time than the thousand years he thought would be needed. We do have magnetic levitation trains in operation, highly productive agricultural brands have been developed, and modern medicine is nowadays able to offer effective medication for most diseases. At the same time, we can see that modern societies have not been able to achieve progress wished by Franklin within the social dimension. Economic growth is nowadays proceeding in a very unequal manner, and most of the riches produced are consumed by a small minority of the world's population. Hundreds of millions are living in extreme poverty and many kinds of tensions and conflicts are dividing different groups of people. Man's power over matter is used not only in order to fulfil the most essential human needs, but also to develop terrible weapons of mass destruction, and it is used in increasingly imaginative ways to feed man's own narcissism. The development of modern human civilisation has seriously disturbed the earth's ecological system, and enormous damages will probably be caused by the warming of the atmosphere in the relatively near future.

Thus, it is fairly easy to say that modern knowledge societies have developed in a very unbalanced manner. We have not learned to manage modern societies as effectively as

we have learned to control natural processes. This is one of the main reasons why many people are nowadays rather sceptical concerning the very future of our civilisation. In today's conditions we cannot put the blame upon the state of 'moral science' as straightforwardly as Benjamin Franklin did during the high time of the Enlightenment. But it is easy to agree with Manuel Castells when he stresses that, in analysing the increasing information and knowledge processing capacities of modern societies, social scientists should pay due attention to the social purposes these forces are put to serve. We should not pretend to be living in an advanced information or knowledge society – or in a network society – if that society is not clearly aware of the real societal and cultural consequences of its doings and if the society is not able to make ethically sound and defensible choices from the point of view of today's human and ecological development. Helping modern societies move in this direction is the worthiest mission that can be presented to theories of information or network society – and this mission remains the same without regard to the particular terminologies used by the researchers.

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