

THE ARCHITECTURE OF THE INFORMATION SOCIETY

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ABSTRACT

The Unified Theory of Information considers society a self-organising and information-generating system hierarchically made up of a series of encapsulated subsystems, as there are technology, ecology, economy, polity, culture. Information society is considered to be endowed with the capability of taking responsibility of the course of societal evolution (Bela H. Banathy). According to that, each subsystem can be characterised by an agency-structure contradiction of its own.

Keywords: informatisation, antagonisms

JANUS-FACED INFORMATISATION

“Informatisation” – a term coined in the 70s by the French scientists at the CNRS, Simon Nora and Alain Minc, in their study “L’informatisation de la société” – is still used in scholarly disputes to depict the very process in which the modern, that is, computer-based, information and communication technologies (ICT) manifest their pervasiveness in shaping our societies to an ever-increasing extent. This process – often compared to the Industrial Revolution, and said to usher in the information age, that is, the age of information societies – has not yet come to an end. On the contrary, the invention, development, diffusion, application, and usage of ICT have gained a global dimension.

This global dimension has already been anticipated by a number of writers and academics. As early as the middle of the 19th century, Nathaniel Hawthorne had one of his novel characters in “The House of the Seven Gables” make the comparison of the globe with a head and brain, in view of the telegraph. The paleontologist and Jesuit priest Teilhard de Chardin regarded the “astonishing system of land, sea and air channels, the postal connections, wires, cables and radio waves, which encircle the earth more each day” as the “creation of a real nervous system of humanity, development of a common consciousness, networking of the mass of humanity,” as he wrote on 6th May 1925 (Teilhard, 1964, 61, 62; see also 1961, 117 f.). On the eve of World War II, Vladimir I. Vernadsky, the Russian founder of biogeochemistry and a father of global thinking pointed out the following (Hofkirchner, 1997, 51): “Human life has, in all its diversity, become indivisible. An event that takes place in the remotest corner of any continent or ocean has consequences, and causes reactions in a number of other places on the earth, be they great or small. The telegraph, telephone, radio, airplanes and balloons have encircled the globe. Connections are becoming ever simpler and faster. Their degree of

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organization increases every year... this process of *complete habitation of the biosphere* by humans is caused by the course of history of scientific thinking, inextricably linked with the speed of communications, the success of transport technology, the possibility of *instant* transfer of thought, and its simultaneous discussion everywhere on the planet.” And in 1964, Marshall McLuhan stated that “after we had extended our bodies in space” in the ages of mechanical technology, by means of “electric technology” then “we have extended our central nervous system itself in a global embrace, abolishing both space and time as far as our planet is concerned” (1997, 3).

Contrary to the optimistic ideas of these early global thinkers, societal development today is marked by a sharp discrepancy between the practice of technically unifying the world, and the social theory of world unity; between the universe of communication of nation states, and the universal community of mankind (postulated time and again in models since the enlightenment); between the reality of globalisation and the ideals of humanity, evolving a global mind including self-awareness, consciousness, and conscience. That is to say, technology is ambivalent as always. Technology has the meaning, the purpose, the task of functioning as means and method for solving social problems. Social interests are thus in the origin and manifestation of technology, in its invention, diffusion and application, in the entire process of its development, as its *raison d'être*. This, however, is insufficient to enslave technology completely. Sometimes it appears to resist our intentions by wholly or partly failing to do what is wanted of it, other times it not only fulfils our expectations but goes on to do other useful tasks which originally had not been anticipated. Technology represents a potential for the realisation of societal goals. These technologically realisable goals may correspond to pre-existing goals within society; the practical attainment of these by technological means may, however, cause them to change, at least slightly. It is of course also possible that the intended goals may differ from those which can be reached with technological support. In this case, new technology may be developed in order to meet the requirements, or the requirements may, as it were, be adapted to fit the reality of what is technically possible. Realisable goals do not therefore always exist at the start of the process, but may be discovered as options made available by technology. Whether society decides to pursue these goals on the grounds that they are possible is no longer a question of technology, but rather of society's decision-making. This holds for ICT, too. Informatisation, thus, does not follow a predestined path, it is not fixed, but flexible, though its development can only be understood in the broader context of societal development.

INFORMATION SOCIETY AS A SELF-ORGANISED ENTITY

Starting point is a view of human processes that reconceptualises the central issue in social science – the issue of how agency and structure are to be related – due to a Unified Theory of Information. A Unified Theory of Information looks upon information-generating systems as self-organising systems and considers society and even more information society as just another information-generating and, hence, self-organising system (e.g. Fuchs et al., forthcoming). According to that, social theory is to rest upon a theory of evolutionary systems (see e.g. <http://www.self-organization.org>) which, in turn,

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has to be based upon certain philosophical assumptions. This view of self-organisation in society is able to resort to and integrate important ideas and insights of recent attempts to overcome the dichotomy in social theory which (with the exception of Artigiani, 1991) do not explicitly refer to an evolutionary systems theory of society (e.g. Giddens, 1984; Alexander, 1995; Mouzelis, 1995; Reckwitz, 1997).

This view can be visualised in the following way: There are two levels. At the micro-level the elements of the system, namely actors, are located. They carry out actions, and by the interplay of the fluctuating individual actions, they design fairly stable relations among them which gain a relative independence from the interactions. Structures like that emerge thus on a macro-level, where they exist in their own right insofar as they, in turn, influence the actors. On the one hand, they constrain the individual agency by setting conditions that limit the scope of possibilities to act and, on the other, just by doing so provide it with the potential for realising options it would not otherwise have. The impact of the structures is a constraining and enabling one. In so far as the structures do not cause directly, and therefore cannot determine completely whether or not these options will be realised, for the actions are mediated by the individual actors, dominance cannot control the outcome, either. The structures are inscribed in the individual actors by an endless process of socialisation and enculturation, but the engramms which are produced in the individuals serve as informational tools for the anticipation and construction of ever new actions which may or may not reproduce the structures. Either way, interaction reflects upon the conditions of its own emergence and may consciously be directed at the structures in order to maintain or alter them. In this sense only, that is, because in their recursive actions the actors refer to the structures, these structures play the dominant role in this relation of bottom-up and top-down causation. Nevertheless none of the relations in this causal cycle leads to plain results. Each influence has consequences which due to the inherent indeterminacy cannot be foreseen. By this, and only by this, qualitative change is possible.

The architecture of society, then, is made up of a series of encapsulated systems each of which is a manifestation of the basic cycle of agency and structure described above. These systems are the system of the technosphere, the system of the ecosphere and the system of the sociosphere which, in turn, is made up of the system of economy, of the system of politics and of the system of culture. These systems are deemed to exhaustively list all spheres of society.

After a short description of each of the systems as they are typical of any society, we will turn to identifying the characteristic change they undergo when entering the global information age.

The Informatisation of the Technosphere

Every society is endowed with an infrastructure dominated by technology. Technology is often considered to be a means to a particular end, the means being artificially created, not natural, and something which is not directly necessary for the individual or end-user; it serves rather to fulfil the need to produce something, which is later to be consumed.

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However, technology may be looked upon as more than just the sum of such artefacts, which are merely the crystallised, concrete manifestations of human behavioural patterns. A method is the “how”, the way in which a goal is reached, and which involves the use of means. A means is a medium, in that it mediates between the starting point and the desired result, regardless of what sort of action is involved. So, technology also includes the know-how involved in the use and application of the artefacts. In short, technology is deemed to embrace the ways and means of acting in pursuit of a goal. It is to augment the actors that take the role of productive forces in that they produce something when they aim at something. The technosphere is the sphere in which the actors of society carry out their instrumental activities. Instrumental activities are the use of technologies as well as the creation of new technologies. The overall aim to which the technological augmentation of productive forces is to contribute is to secure a peaceful development of civilisation.

Now, the spread of ICT brings about a change in the very sphere of using and creating technology. Technology itself changes. By coupling with the computer which mechanises certain abilities of the human brain the machine of the industrial age which only mechanised abilities of the human body turns into an automaton.

The ambivalence of informatised technology comes to light: Will automation contribute to augment productive forces and further security and peace and by that raise civilisational integrity? Or will it serve destructive purposes and raise the vulnerability of the information society, instead?

Example: 9/11 manifested how vulnerable technological civilisation really is.

The Informatisation of the Ecosphere

“Ecosphere” shall be the label for the sphere of society that comprises the flows of matter and energy in support of the physical life of the actors. The actors are living beings that organise their metabolism in a common and interdependent way. The part of nature they influence is their “*Umwelt*” consisting of natural resources they need for life support. Human living beings restructure nature in order to be able to appropriate it in the way they require. Contrary to all the other life forms on our planet, humans are able to consciously design their metabolism and to produce their *umwelt* whenever nature itself is not capable of reproducing itself for the sake of humans. Sustainability denotes such a delicate balance between the human nature and the humanised nature.

Industrialisation multiplied material and energetical fluxes to an extent never seen before on earth. The flows threatened to get out of control. James R. Beniger calls the information revolution in this respect “control revolution” by which control over the flows can be regained.

The question arises: Will the control revolution be used for restoring the balance between human living beings and their *umwelt* and raise ecological integrity? Or will it further the degradation of environment by means of computer use, instead?

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Example: As the Iraq War showed, environmental damages are taken into account by the sides at war.

The Informatisation of the Sociosphere

Technosphere and ecosphere set up the basis of society. The sphere in which the actors as social beings construe social relations concerning resources (economy), regularities (polity) and rules (culture) may be termed “sociosphere”. In the sociosphere social actions are carried out. Tangibles and intangibles (goods, be they material or immaterial) are produced and consumed. Every social being is called to co-design the collective in which the supply of the goods is provided. The more the actors have access to the supply, the more the sociosphere is well-balanced, fair, just.

By the increasing number of ICT applications dislocated throughout the sociosphere the network society arises (Castells). Networking means the increasing interdependence of the actors and the increasing dependence of the actors on access to the means of managing this interdependence which are provided by ICT.

Will networking facilitate the access to the supply and increase justice and, thus, raise social integrity? Or will it contribute to social disparities and increase potential conflicts and raise the digital divide, instead?

Economic, political and cultural actions can be differentiated.

The Informatisation of Economy

Economy is about self-preservation of the actors through access to resources. Economy is that sphere of society where the actors do work in order to meet their demands. The social relationships that emerge here and channel the self-preservation of the actors are property relations – property being the disposition of resources. According to the power of disposition resources are allocated to the actors, that is, goods are distributed to them. The regulative idea for the allocation is solidarity.

The information age is characterised by knowledge becoming an essential resource itself, becoming a new factor in the production process of society (Toffler, 1981).

“Knowledge mining”, however, is confronted with a certain attribute of knowledge which has consequences for the proprietary handling of it. In sharp contrast to other goods, knowledge is a good that, in principle, is not used up after being used, it does not vanish. For that reason, knowledge turns into a seemingly infinite resource while economy is said to deal with scarcity. Thus the basic question of the informatisation of the sphere of economy runs: Will knowledge be made accessible for each economic actor who is in need of it? Or will knowledge be kept in the bounds of private ownership and treated as commodity, instead?

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Example: How disastrous withholding knowledge from people can be, is shown by the economic sanctions imposed by the UN Security Council on Iraq in the aftermath of the Second Gulf War.

The Informatisation of Polity

Politics is about power, namely, power of decision. The disposal of means of power means the ability to influence decision-making processes about circumstances of life in general including economic affairs. It represents regularities of how actors pursue interests. By resorting to power actors are authorised to determine themselves. The more political actors have a determining influence on decisions, the more they are deemed free.

The development of ICT alters the nature of the polity: it becomes the agora of “noopolitik” where governmental and non-governmental actors meet, while bureaucracy turns into “cyberocracy” (Arquilla, Ronfeldt, 1999, Ronfeldt, 1992).

What is at stake here is: Will the informatised polity empower the political actors? Or will it extend the control over them, be they interior or foreign (Information Warfare), instead?

Example: Noopolitik can take the form of acting unilaterally against the international law and replacing a regime by one that suits the own interests better as is demonstrated by the United States’ war on Iraq by which a new world order shall be implemented.

The Informatisation of Culture

Culture is about rules in society, including the regularities of political life. It is the field of discourse in which the actors can express themselves as long as they happen to gain influence by sharing the power to define values, ethics, morals (Artigiani, 1991). The power of definition legitimises actors to act in a specific way. The ideal of equality would be fulfilled, if all cultural actors share the same power of definition.

The information revolution affects the mutual dependence of science, on the one hand, and values, ethics, morals, on the other, by giving more emphasis to the role scientific thoughts play within society. Science is committed to truth.

Will the penetration of everyday life with science help suppress rules of social interaction that are not in compliance with findings that are claimed to be true and, in turn, will it help place an obligation on science to undertake inquiries for the sake of humane purposes only and will it thereby help create a true noosphere as Teilhard de Chardin and Vernadsky were envisioning? Or will it contribute to distorting consciousness by infotainment and disinformation and to distorting conscience, instead?

Example: United States mass media, in particular, TV stations, played an important role to make the people ready for war against Iraq. The same holds for European media concerning the Kosovo war.

UNDERLYING DEVELOPMENTAL DIALECTICS

The ambivalent developments ICT promote are not completely new. The contradictory tendencies of the increase either in civilisational integrity or in the vulnerability of society, of the increase either in ecological integrity or in abuse and pollution of the environment, of the increase either in social integrity or in conflict potential, that is, either in meeting economic demands, in participation in political affairs and in finding recognition in cultural life, on the one hand, or in the exclusion of these spheres, on the other, are interwoven with laws of development that underlie society since ever. Informatisation is rather a catalyst of fundamental societal developments which are given a new appearance than a creator of possibilities *ab novo*.

The antagonistic aggravation of tendencies in societal development on the threshold of the global information age is the continuation of some antagonisms that are due to the specific construction of societies in the epoch of domination that, in turn, is the actualisation of a potential that is laid down in the general conditions of human processes (see table).

In the cultural sphere the human process of self-expression of actors turned historically, under the premise of domination, into an antagonism between equality and lacking in influence due to false consciousness. This antagonism turns again, in the course of informatisation, into an antagonism between (scientific) rationality and (mass) mediated manipulation.

In the political sphere self-determination has become antagonistic when there has been domination. The antagonists are freedom and powerlessness which appear as e-democracy and Big Brother to the inside and to the outside when entering the information age.

In the economic sphere, there is self-preservation having been exposed to the clash of solidarity with expropriation in dominantly ordered societies and to the clash between the great hypertext which comprises all knowledge of humanity and information monopolies under the influence of ICT.

Taken together, the cultural, political and economic sphere manifest an underlying antagonism between the human beings and the “Net” (as pointed out by Castells). This antagonism of the information age goes back to the antagonism between justice and alienation from fellow human beings which is the form in which the production of sense appears in the epoch of domination.

This historical development in the sociosphere has been accompanying corresponding developments in the ecosphere as well as in the technosphere. As to ecology, the human process of survival has been unfolding under domination into the contradictory tendencies of sustainability and alienation from nature that again metamorphose, given the rise of the information society, into the contradiction between human beings and “Gaia” (Lovelock, 1987). As to technology, domination has been realising possible

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incongruities of human instrumental activities and making peace and security fight alienation from technology. ICT intensify this conflict in the form of human beings in opposition to the “Megamachine” (Mumford, 1964).

Taken together, in the beginning of the information age the societal sphere can be characterised by an antagonism between the information rich and the information poor in which the antagonism between inclusion and exclusion is continued in a different form. Inclusion and exclusion identify societies in which some actors dominate other actors. The possibility of domination finds its predisposition in the interplay of individual and society, in the relationship of agency and structure.

Now it's time to take one more step back and to take a system's perspective. Negative external effects that are possible in human processes have been realised in the epoch of domination and are nowadays threatening with the breakdown of human systems. They call for a breakthrough toward a higher organisation of human systems. Up to this point in time, the development of societies was regulated by the logic of externalisation of effects of actions, rather than by mutual care and reciprocity. Humanity still is divided by the principle of competition and is developing into secondary subjects which are detrimental to one another. The question arises as to what extent the present self-organisation of global information society is compatible with the prevailing development principle of society (which means that development of one subject is at the expense of another one) or demands the latter to be superseded by one which takes co-operative relationships between humans as its point of departure and which no longer takes into account short-sighted sub-aims for the whole (Die Gruppe von Lissabon 1997). The growing importance of information whose nature seems to evade conventional forms of appropriation is an argument in favour of a new principle of guiding evolution of societies. Comparable to the convergence of independent atoms to molecules, or molecules constituting macro-molecules, or the progression from cellular, to multi-cellular, ecological and cultural systems, we might envisage today the emergence of a societal super-system which can be evoked by the joint action of conscious agents who anticipate this new principle of co-operativity.

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		human processes	in the epoch of domination	on the threshold of the global information age
systemic	negative external effects			
		are possible	are realised	are threatening with breakdown
societal	interplay of individual and society		antagonism between	
			inclusion and exclusion	information rich and information poor
technological	instrumentation		antagonism between	
			peace and security and alienation from technology	humans and the Megamachine
ecological	survival		antagonism between	
			sustainability and alienation from nature	humans and Gaia
social	sense production		antagonism between	
			justice and alienation from other humans	humans and the Net
eco- no- mic	self-preservation		antagonism between	
			solidarity and expropriation	the Great Hypertext and information monopolies
poli- tical	self-determination		antagonism between	
			freedom and powerlessness	e-democracy and Big Brother
cul- tural	self-expression		antagonism between	
			equality and lacking in influence	rationality and mediatised manipulation

Table 1. Antagonisms of the Information Society.

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REFERENCES

- Alexander, J. C. (1995). *Fin de Siècle Social Theory – Relativism, Reduction, and the Problem of Reason.*, London etc.
- Arquilla, J. and Ronfeldt, D. (1999). *The Emergence of Noopolitik. Toward an American Information Strategy.*, RAND.
- Artigiani, R. (1991). “Social Evolution - A Nonequilibrium Systems Model,” in *The New Evolutionary Paradigm*, (E. Laszlo, ed.), Gordon and Breach, Amsterdam.
- Castells, M. (1996-1999). *The Information Age*. 3 Vols., Blackwell, Cambridge, Mass.
- Beniger, J. R. (1986). *The control revolution. Technological and economic origins of the information society.*, Harvard Univ. Pr., Cambridge, Mass.
- Die Gruppe von Lissabon (1997). *Grenzen des Wettbewerbs – Die Globalisierung der Wirtschaft und die Zukunft der Menschheit.*, Darmstadt
- Fuchs, C., Hofkirchner, W. and Klauninger, B. (forthcoming). “The Dialectic of Bottom-up and Top-down Emergence in Social Systems,” in *Problems of Individual Emergence, Proceedings of a Conference*, (M. Vahl, ed.), ...
- Giddens, A. (1984). *The Constitution of Society.*, Cambridge.
- Hawthorne, N. (1998). *The House of the Seven Gables.*, Oxford Paperbacks.
- Hofkirchner, W. (ed.) (1977). *V. I. Vernadskij – Der Mensch in der Biosphäre. Zur Naturgeschichte der Vernunft.* Peter Lang, Wien, New York.
- Lovelock, J. (1987). *Gaia.*, Oxford University Press.
- McLuhan, M. (1997). *Understanding Media. The Extensions of Man.* Routledge, London (first published 1964).
- Mouzelis, N. (1995). *Sociological Theory – What went wrong? Diagnosis and Remedies.*, London etc.
- Mumford, L. (1964). *The Myth of the Machine. The Pentagon of Power.*, Harcourt, Brace, Jovanovich, New York.
- Nora, S. and Minc, A. (1978). *L'informatisation de la Société.*, Éditions du Seuil, Paris (English: *The Computerization of Society.*, MIT Press, 1980).
- Reckwitz, A. (1997). *Struktur – Zur sozialwissenschaftlichen Analyse von Regeln und Regelmäßigkeiten.*, Opladen.
- Ronfeldt, D. (1992). “Cyberocracy is coming,” *The Information Society.*, 8(4): 243-296.
- Teilhard de Chardin, P. (1961). *Die Entstehung des Menschen.*, Beck, München (French: *Le groupe zoologique humain*).
- Teilhard de Chardin, P. (1964). *Auswahl aus dem Werk.*, Walter, Olten, Freiburg (French: *La vision du passé*).
- Toffler, A. (1981). *The Third Wave.*, Bantam Books, New York.