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A Critical Social Systems View of the Internet

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The article discusses principles that form part of evolutionary systems thinking in social sciences and humanities. It is argued that introducing the concept of self-organization relates agency and structures in a way that makes it possible to take up certain features of Critical Theory by which it can meet the demands for a critical social science. These principles are applied to the question of whether there is convergence or divergence in and by means of the Internet. It will be clarified that the Internet is basically a social system and that it is a subsystem of the larger and overarching system of the whole society. It will be shown how the Internet can be perceived as a possible trigger for societal developments bringing about fundamental change in the nature of society. Thus the article cuts across philosophical, system theoretical, social theoretical, sociology of technology, and information society theory considerations.

Keywords: *dynamic; "mechanism"; self-organizaton; revolution; evolution; Critical Theory; information society; Internet*

1. Critical Social System Theory

Social research, if empirical, needs and is impossible without theories. According to the saying that there is nothing more practical than a good theory, theoretically grounded insights have the potential of making a broad and deep impact. More often than not, the underlying theories are not made explicit and may hinder the application to a greater range of cases. Also, non-reflection of underlying theories may make the results gained, willingly or not, open to arbitrary use or instrumental for partial interests. A critical stance in social research is not possible without unearthing the hidden assumptions. Therefore it is advantageous to make explicit what is implicit.

A grand social theory makes explicit general implications on the nature and development of society. This is important, because every discussion of

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specific societal issues implies assumptions on a general level, whether they are explicitly stated or not. A grand social theory—like any theory—offers a heuristic function: it guides theorizing on the middle-range level and concrete empirical research while being open to modifications according to feedback from these more specific levels. There is a dialectic between the general and the specific which is fruitful for both sides and for research at large.

In opposition to, and in the aftermath of, postmodern de-theorizing society, there have been but few efforts to adhere to or regain the claim of general theory in sociological and historical thinking. Among them there are three German threads in sociology, each of them making up a certain deficiency in the other. The first is connected to the name of Habermas (1971, 1979, 1984, 1987, 1989); he postulates a chasm between life-world and social system, but in taking care of the freedom of the individual, he is skeptical about the system-like nature of society. This thread stands in the tradition of the Enlightenment, values reason highly, and states that modernity is not yet accomplished.

The second dates back to 1984 when Niklas Luhmann published his book on social systems (Luhmann 1984), claiming to make use of the so-called theory of autopoietic machines which Chilean neurophysiologists Maturana and Varela had developed and applied this theory to society; this is a thread which—though having culminated so far in the two-volume, more than 1,000 page publication *Die Gesellschaft der Gesellschaft* (Luhmann 1997)—has only recently met with a favorable reception in the Anglo-Saxon world of sociology. It is a thread which, on the one hand, is characterized by a sophisticated terminology but, on the other, has been criticized for lacking practical consequences.

The third began in 1986 with Ulrich Beck's famous book *Die Risikogesellschaft* in which he introduced the idea of a different modernity, and which was followed by a number of publications leading up to his special book series, "Edition Zweite Moderne" with Suhrkamp publishing (see e.g. Beck 1997); this is a thread, however, that is seductive in its comprehensive political approach and its pragmatics, but less in its theoretical coherence.

However, these three threads are unsatisfactory because they neither resolve the core of the problem around which each general sociological theory can be said to revolve nor do they intend to do so. This central theme is known today as the dualism of agency and structure (see Reckwitz 1997). The answer to how to relate individuals and society makes the paradigms of grand social theory distinct from each other.

Table 1
Paradigms of Grand Social Theory

		How to relate. . . individuals. . .	and society resulting
Positivism	*individualism (reductionism):* action theory	necessary and sufficient	
Interpretivism	*"societalism" (projectionism):* structuralism,. . .	resulting	necessary and sufficient
Postmodernism	*individual–society dualism:* Luhmann	independent	
Critical thinking	*individual–society dialectic:* theory of social self-organization (critical social systems theory)	interdependent (society emerges from, and shapes, in turn, individuals)	

There is a variety of different approaches toward theorizing society at large. These approaches are often referred to as positivistic, interpretivist, postmodern, and critical paradigms in sociology.

One possible answer to that question is individualism (see Table 1). Theories belonging to that kind of conceptualization methodologically, ontologically, and ethically give priority to individual action and related phenomena and postulate that societal facts and related phenomena are to be logically derived from the individual ones, are in a modular way built up by the latter, and do not possess values different from values on the individual level. The way of thinking underlying individualism is reductionism and makes it positivistic. Societal phenomena are reduced to phenomena on the individual level. Knowledge of individual phenomena is necessitated by and suffices for getting knowledge of phenomena on the society level; the second results from the first. The most well-known example for individualism is rational-choice theory in economics. The whole paradigm often is labeled action theory or subject theory. Agent-based modeling methods may suit this approach.

> Individualists are . . . bound to miss one of the most important and intruiging of all kinds of events in society . . . namely the emergence of novelty. More precisely, they miss the emergence of things with systemic properties, that is, properties that their components or their precursors lack—such as cohesiveness,

> stability, income distribution, division of labour, social stratification, and social order. By the same token, individualists fail to realize the existence of systemic social issues, such as those of poverty, overpopulation, wealth concentration, political oppression, superstition, and underdevelopment. None of these issues can be solved by doing one thing at a time . . . Bunge (2003, 75)

The opposite of individualism might be called "societalism" (see Table 1). This tradition goes back to Emile Durkheim who insisted on the autonomous existence of social facts. Recent representatives of this variety are functionalist and structuralist theories. In this view social facts, social functions or social structures are deemed necessary and sufficient to describe, explain, or predict what is going on at the individual level. Instead of being reductionist, this way of thinking extrapolates or projects phenomena which are found on a higher level onto a lower level where these phenomena cannot be found. Insofar as it stresses some whole to be examined to understand phenomena, it is interpretivism. Several systemic approaches belong to that category.

Another solution similar to the previous one is to grant autonomous existence to phenomena of individuals and society, respectively (see Table 1). Here individuals are cut free from societies and vice versa. In contrast to the monism of the two answers above, this is dualism, en vogue in postmodern thinking. Niklas Luhmann's theory of social systems, for example, is dualistic since his social systems (subsystems of society) are made up of communications only while the psychic systems (individuals) belong to the environment of the social ones.

Those theories which aim to overcome the chasm between agency and structure fall into the fourth category (see Table 1). They include the works of Bourdieu (e.g. 1977, 1990, 1993, 1994, 1996) and three Anglo-Saxon sociologists: Alexander (e.g. 1995), Giddens (his most famous work being *The Constitution of Society*, where he outlines his so-called Theory of Structuration, which was published in 1984), and Mouzelis (1995). All of them deal with duality or dialectic in contrast to dualism.

In addition, there are writings of scholars who do not have a sociological but rather an interdisciplinary background that belong to this group of theories: the three-volume work of the Dutch expert in International Relations, Johan K. De Vree (1990), who develops a system-theoretical approach, starting with thermodynamical considerations, and by doing so avoids the fundamental shortcoming of cutting society free from the material-energetic world (a mistake which Luhmann makes), has to be mentioned here, as well as the information-science trilogy written by biologist Tom Stonier (1990,

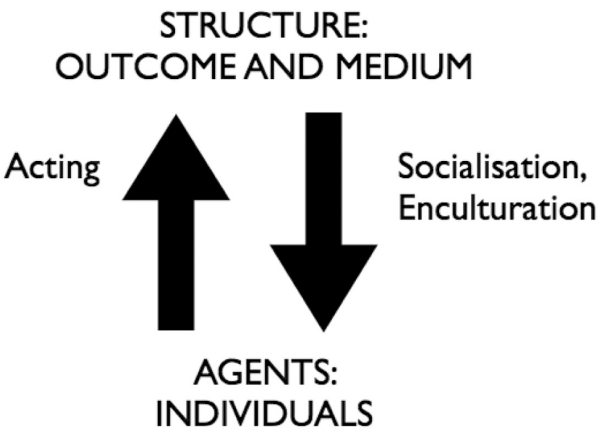
1992, 1997), Professor Emeritus for science and society at the University of Bradford, who offers an evolutionary perspective of societal development up to the information age. Both of them have been active in the Foundations of Information Science community which started more than a decade ago.

Furthermore, there are several approaches which aim at theories of a global brain (such as the Principia Cybernetica Project group around Francis Heylighen; see e.g. 1995, 1997, from a cybernetics point of view), or collective intelligence (Lévy 1997 from a philosophical point of view), or draw parallels between super-organisms and mankind (Stock 1993), or between biotic and cultural developments in general (see e.g. the living systems theory of James Grier Miller [1978] and the Miller and Miller [1992] article, or Peter Corning's Synergism Hypothesis [1983]), or they share an evolutionary perspective without referring to biology (e.g. Malaska 1991; Artigiani 1991). All of them refer to a science of complexity and self-organization paradigm in one way or another and make use of concepts of evolutionary and systems thinking together. As Mario Bunge puts it (2003, 75): "Individualism sees the trees but misses the forest, whereas holism sees the forest but overlooks the trees. Only the systemic approach facilitates our noticing both the trees (and their components) and the forest (and its larger environment)." Thus taking up the strands in sociological reasoning that focus on complexity themes while appreciating the valuable contributions of the remaining strands of a grand social theory, elaborating on a theory of social self-organization promises a more thorough solution to the key problem of sociological theory.

The dialectical relationship between agency and structure being a process whose products freeze into structure, which in turn influences further processes of action as it enables them and constrains them at the same time, can easily be retheorized in terms of a feed-forward and feed-back loop between society as a (supra-)system, and individuals or systems of individuals as elements or (sub-)systems: a loop that does not mediate strictly deterministic causations, but allows for the emergence of new qualities instead (see Figure 1, Hofkirchner [1998]).

Societal structures emerge from individual actions and individual actions are shaped by societal structures. 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

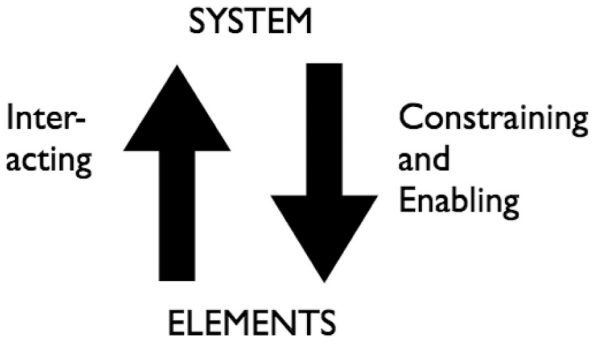
Figure 1 The Dynamic of Social Self-organization



it with the potential for realizing options it would not otherwise have. The impact of the structures is a constraining and enabling one (Giddens 1994). In so far as the structures do not cause directly, and therefore cannot determine completely, whether or not these options will be realized, 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 socialization and enculturation, but the engrams which are produced in the individuals serve as informational tools for the anticipation and construction of new actions which may or may not reproduce the structures. Either way, interaction reflects on the conditions of its own emergence and may consciously be directed at the structures to maintain or alter them, since 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 in this sense only. Nevertheless none of the relations in this causal cycle leads to plain results. Each influence has consequences which because of the inherent indeterminacy cannot be foreseen. By this, and only by this, qualitative change is possible.

Thus, individuals and society are interdependent (none of them can be understood without the other), they oppose each other (none of them is fully understandable by understanding the other), and they build a hierarchy

Figure 2 The Dynamic of Self-organization



(society plays the dominant role). They form parts and a whole which is a dialectical relationship. Dialectics is said to apply whenever two correlates build a mutually dependent relationship between themselves as opposites in an asymmetrical way. This interplay of individuals and society is the central dynamic of social systems. It is the manifestation of the interplay of elements and system which is the central dynamic of complex systems (see Figure 2).

It was Bunge who contrary to most scholars of systems thinking introduced the notion of processes in the definition of systems. According to Bunge's Composites, Environment, Structure, Mechanism (CESM) model (2003) a system s is to be defined by the collection

$$\mu(s) = [C(s), E(s), S(s), M(s)]$$

whereby C stands for the composites, E for the environment, S for the structure, and M for the "mechanism," that is, the processes, of the respective systems. So Bunge makes clear that a system cannot be defined only by the set of elements and their relations to an environment. The processes that actually make the system a system have to be included in the consideration. In complex real-world systems this is, basically, self-organization. This dynamic comes in a variety of manifestations dependent on the concrete, particular nature of the system in question.[1]

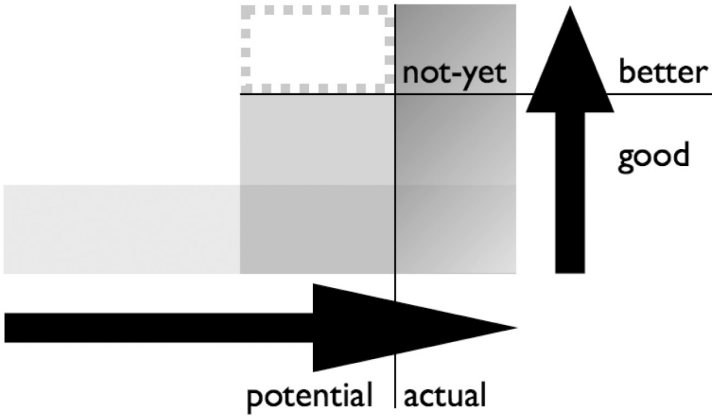
Evolutionary systems theory—a term coined by Ervin Laszlo (1987), Vilmos Csanyi (1989), and Susantha Goonatilake (1991)—as a theory about evolving systems and as a theory that is the result of the merger of systems theory and evolutionary theory which nowadays not only applies to biotic and human or social systems but also to physical systems, that is, to the cosmos itself (Layzer 1990; Smolin 1997). It is the most recent elaboration of General System Theory as founded by Ludwig von Bertalanffy (Hofkirchner 2005). It revolves around the notion of self-organization. It provides a transdisciplinary framework for consilience throughout science thereby positioning social science within the orchestra of disciplines.

Evolutionary systems theory distinguishes between different levels of self-organization, i.e. self-organization has aspects that are common to all types of systems as well as aspects that are particular to each concrete type of system. In each self-organizing system there is this relationship between elements and system. In a social system, as distinct from a living system or a physical system that is prehuman, self-organization refers to the so-called re-creation (Jantsch 1992) of such a system. Re-creation means that social systems do not only have the capacity to modify themselves (as physical self-organizing systems do) and to maintain themselves (as living self-organizing systems do), but they also have the capacity to re-invent themselves, to shape themselves, to produce a specific character by which the individuals that are parts of a social system can strive to realize themselves in a more or less self-determined way. That is to say, systems at the evolutionary stage of human society are just another—but new—way of metabolism nonhuman living systems carry out (just as systems at the evolutionary stage of living beings are another way of making use of energy that nonliving material systems do).

The core of evolutionary systems theory is a stage model. It is a phase model and a layer model in one. The stage model of evolutionary systems is based on the principle of emergentism and the principle of asymmetrism. Emergence takes place in transitions in which by the interaction of proto-elements systems are produced. Asymmetry describes the suprasystem hierarchies in which subsystems are encapsulated. The shift from one phase to a subsequent phase is tantamount to a shift onto a new layer. The new system includes this additional layer. It encapsulates what previously were autonomous systems as subsystems and shapes them to reflect the dominance relation. However, the newly formed system will always depend on the functioning of its subsystems. When they cease to support the system, it will break down.

In that way, evolutionary systems theory resembles dialectical thinking as to "sublation" ("Aufhebung") in Hegel's sense. The first connotation of

Figure 3 Not-Yet



sublation which is to break, to cancel, to nullify, that is, to discontinue, is reflected in the stage model by the point that marks the end of a certain stage of evolution. The second connotation which is to keep, to save, to preserve, to store, that is, to continue, comes to the fore when the scheme concedes that each new layer is built on a preceding one and that the new stage comprises not only the new layer but parts of the old one. The third connotation which is to raise, to lift, that is, to leap in quality, is depicted by the notion of the higher level that exerts downward causation onto the lower ones.

Evolutionary systems theory, thus based on dialectical philosophy, sketches the framework of social self-organization in a critical theory of social systems. Being critical can be ascribed to this theoretical framework in that it is normative while doing justice to the factual at the same time. For it includes not only an account of the potential that is given with the actual but also an evaluation of the potential which sorts out the desired. Thus this theory embraces an ascendence from the potential given now to the actual to be established in the future as well as an ascendence from the less good now to the better then which altogether yields the Not-Yet in critical theorist Ernst Bloch's sense. These processes aimed at the Not-Yet are at the core of the dynamic of social self-organization (see Figure 3). By the notion of the Not-Yet Bloch tried to salvage the idea of utopia—it is not

any longer a nowhere deprived of the possibility to get there but a future that can be glimpsed and anticipated in what is already possible here and now. That systems theory incorporates values does not come as a surprise when looking back to the forerunner of evolutionary systems thinking, the General System Theory of Ludwig von Bertalanffy who took a normative stance. System theory, in his opinion, had to be based on humanism (see Hofkirchner 2005).

2. Critical Information Society Theory

A Critical Social System Theory, a few cornerstones of which have been laid out above, is the basis for a critical approach toward the society of the Internet—the information society. The big question discussed widely is whether or not convergence in society is brought about by the spread of Internet technology (this, for instance, was the overall topic of the conference of the Association of Internet Researchers in Brisbane 2006). This question is about the nature of the social impact of modern information and communication technologies like the Internet: Will the virtual communities that form around and with the help of the Internet change society so as to unite it by the promotion of cooperation, participation, peaceful conflict resolution, collective intelligence, and so on, or will they contribute to the disintegration, fragmentation, heterogenization of society? Will the members of society, the social actors, by use of the Internet converge because of strengthened cohesion or will they fall into an exaggerated individualism? Will institutions of society through the advent of the Internet harmonize with each other or will they prolong contradictions?

Systemism is of help in finding answers to these questions. The discussion will make use of the concept of the dynamic of social self-organization in the dialectical, evolutionary systems perspective laid out above. There are several steps in developing the argument. First, considering the synchronous aspect, there is an inner dynamic of the social system called technology, and, in our case, Internet, and there is a dynamic that is results from this social system's being part of the overall system of society. Second, taking into consideration the asynchronous aspect, there is a sequence of stages in the technological and social development that is the outcome of the dynamic in different granularities. Third, after having discussed this application of the concept of dynamic to the Internet, a preliminary answer to the question of convergence versus divergence can be given.

2.1 The Dynamic of the Internet

My point of departure is the concept of the Internet as a techno-social self-organizing system. Being a techno-social system means that the core insight of theories of socio-technical systems from the Tavistock Institute to Günter Ropohl (1979, 2001) can be applied to the object in question.[2] Thus, in dealing with the nature of the Internet, a critical information society theory has to start from the perspective of the Internet as an inherently social phenomenon.

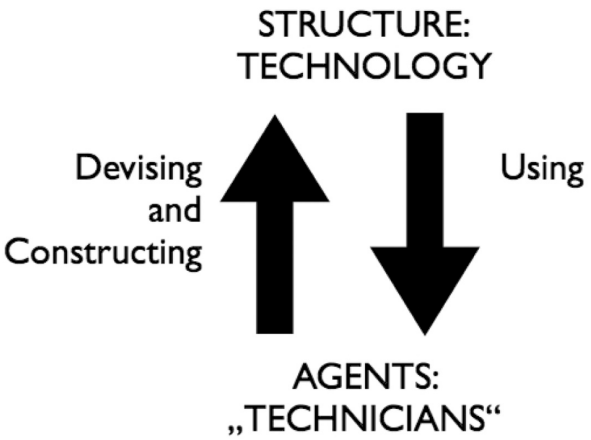
2.1.1 The Internet as a Social System

Usually, the Internet is defined as a network of computer networks that work on the basis of a common protocol, the Transmission Control Protocol/Internet Protocol (TCP/IP)—a definition that was promoted by the Federal Networking Council and the RFC 2026 of the IETF (Internet Engineering Taskforce). A definition like this, however, is technology-oriented to such a degree as to exclude humans from the focus and renders social and human science perspectives irrelevant. It is worth reminding ourselves of what visionaries and pioneers like James C. R. Licklider claimed in that respect:

> The collection of people, hardware, and software—the multi-access computer together with its local community of users—will become a node in a geographically distributed computer network. . . Through the network, therefore, all the large computers can communicate with one another. And through them, all the members of the supercommunity can communicate—with other people, with programs, with data, or with a selected combinations of those resources." (Licklider and Taylor 1968, 36)

As with all technology, networks of computers do not make sense unless embedded in the social context which animates them. Thus, a perspective like this is required for understanding the Internet's life of its own. Otherwise the Internet would be an inert thing—just a fancy (a gedankenexperiment) which implies that if neutron bombs destroyed all human life on earth, the computer infrastructure would remain intact: there would be shallow mechanisms working until energy would be depleted, and nothing would change with it except its running out of work. Each technological infrastructure has to be maintained, restored, repaired, reproduced, adapted, modified, improved, and so on, through work which only human society is capable of doing. This is true for the Internet too.

Figure 4 The Dynamic of Techno-social Self-organization

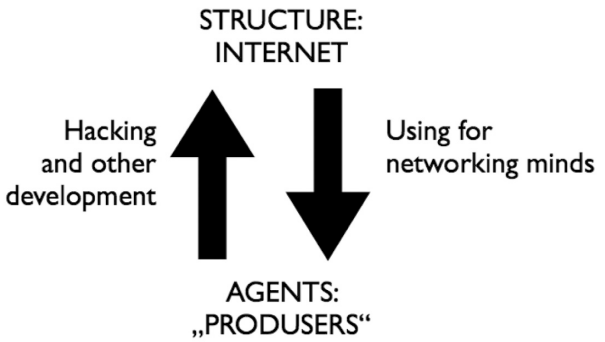


This means that the Internet like every technology belongs to the technological infrastructure of a society or the technosphere that cannot in a meaningful way be defined without humans. The technosphere itself is a social system with individuals at the microlevel and technology at the macrolevel. The individuals are humans in their social role as "technicians"—as producers and as users of technology. Producing and using technology is the self-organizational dynamic of such a techno-social system (see Figure 4).

The technosphere is the sphere in which means are produced, that is, in which human beings are active in innovating and applying scientific-technological tools in the course of social life. 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. An infrastructure of tools, methods, and capabilities which comprise the overall forces of soicety is the base of human systems. Technology 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.

Thus the Internet is not grasped satisfactorily when defined in a technologically restricted way. The Internet includes not only technological devices

Figure 5

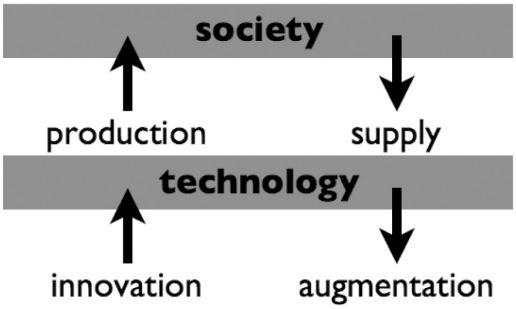


but the community of its producers and users. It is humans that are connected via the connection of computers and it is humans that are the driving force behind new applications (see also Fuchs 2005). It is just in the case of the Internet that the important role of humans in technology became clear: there is a trend toward the convergence of producers and consumers that gave way to the notion of "prosumers"; the consumers of the Internet are the users, they have become the producers as Howard Rheingold showed in his books (e.g. 1993, 2002). So it has become common to talk about "produsers" of the Internet (see Figure 5). The devising and constructing of Internet applications includes "hacking"—a term depicting the community-driven development—besides research and development in commercial or governmental contexts, the objective of the usage of Internet applications is to network human minds.

2.1.2 The Internet as Part of the System of Society

On closer scrutiny, there is another argument for the social nature of the Internet which goes beyond the argument concerning the inner dynamics of technology. Technology is inherently social also because it is embedded in the social context to such an extent that it can be perceived as a subsystem of the overarchig system of society. Technology is encapsulated in a nested hierarchy of systems and so does the Internet. Humans play different, albeit not totally decoupled but overlapping roles in societal life. They are not only technological agents but also ecological, economic, political, and cultural ones. As such they find themselves in different subsystems of society which

Figure 6 The Dynamic of Techno-social Self-organization in the Hierarchy of Society



build a certain architecture (see Fuchs and Hofkirchner 2005). For reasons of simplification, all non-technological roles of humans can be subsumed under the role of being a member of society in general and all non-technological subsystems can be subsumed under the system of society in general—the sociosphere.

The sociosphere as a whole is the sphere in which goals are produced. It is the sphere in which human beings perform social actions. Here they constitute what is meaningful to them and realize it. Meaning is then another of the higher qualities brought forth by the specific self-organization of human systems. In fact, it is the result that constitutes the differentia specifica to nonhuman biotic systems. 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 goods is provided. The technosphere is just one instantiation of the overall self-organization of society. Producing technologies for improving the productive forces (innovating) and applying technologies (augmenting production) for the improvement of the products to be consumed is meaningful, that is, it is a kind of production of meaning. Thus, in a specification hierarchy the technosphere forms a subsystem of the sociosphere (see Figure 6).

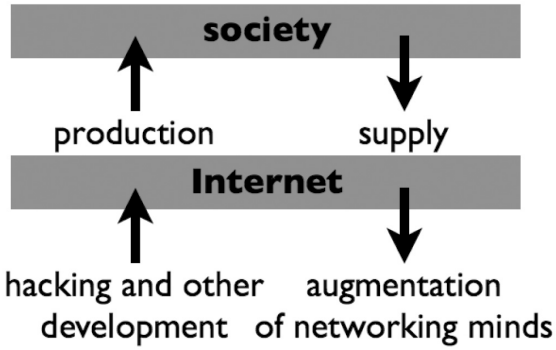
Adding the hierarchy to the dynamic of technology means acknowledging a bigger picture. It means that the processes within the technological realm have to be complemented by processes outside. It means that there is interdependence between technology and society and that there are mutual shaping

processes (as we have termed it elsewhere; see Herdin, Hofkirchner, and Maier-Rabler 2006). There are "impacts" of technology on society as well as societal factors determining technogenesis. There are direct or indirect effects, short- or long-range effects, and short- or long-term effects of technology on society as well as interests and motivations in society that, in turn, play a role in the genesis of technology. These determinations are bottom-up as well as top-down. But none of them is fully, strictly determinating. There is only less-than-strict determinism. Similarly, impacts are not clear-cut nor is technology in absolute accordance with society.

The relationship of technology (as a subsystem of society) and society as a whole is a complex, non-linear one. The form of a certain technology does not determine linear social consequences, but if society is indeed self-organizing and complex one must assume that technologies can cause multiple, non-linear social effects that might even contradict each other. Technology influences society in non-linear ways, just as society influences technology in non-linear ways. The relationship of society and technology is shaped by complex, non-linear circular causality. Technology has the meaning, the purpose, the task of functioning as means and method for solving social problems. Social interests, cultural values, norms, and morals are thus at the origin and a manifestation of technology—in its invention, diffusion, and application; in the entire process of its development; and as its reason for existence. This, however, is insufficient to subordinate technology completely to society. Technology is ambivalent; at times it appears to resist our intentions by wholly or partly failing to do what is wanted of it, at other times it not only fulfils our expectations but goes on to do other useful tasks not originally anticipated. Technology represents potential for the realization of social goals. These technologically realizable 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 to some extent. 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 to meet the requirements, or the requirements may, as it were, be adapted to fit the reality of what is technically possible. Realizable 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 then no longer a question of technology, but rather of social decision-making (Hofkirchner 1994).

In a philosophical vein, it is a part-whole relationship that is characteristic of the technology-society relationship. The parts contribute to the emergence and maintenance of the whole, but the quality of the whole cannot be reduced

Figure 7 The Dynamic of the Self-organizing Internet in the Hierarchy of Society



to any quality of the parts. The whole exerts a pressure on the parts, but it will fail to wholly anticipate their interaction.

The same holds for the Internet (see Figure 7).

That is to say, the dynamic of the self-organizing Internet is not without influence on the dynamic of the self-organization of society nor does it unfold independent of society.

It is the well-known technodeterminism that by the term "information society" denotes a society in which information and communication technologies (ICTs), the Internet, and the computer are widely used. Pessimistic and technophobian writings bemoan negative impacts of the Internet on society through digitization and virtualization. Contrary to these push-approaches, there is a variety of social constructivism that resort to a pull-approach and identify certain non-technological factors as the leading determinants for our "knowledge society" or for "knowledge monopolies," for participation through e-government or for control and surveillance, for the fun and leisure society or for the manipulated society. Systemism can reveal the one-sidedness of these approaches because of their strict deterministic thinking. Systemism turns the perspective of a mutual shaping of technology and society into the only practicable pro-active guidance for designing the Internet according to the needs of society, whereas deterministic theories see either no possibility of or no necessity for intervention. Unwillingly or not, they support prevailing approaches that are industry-funded, especially funding social-scientific rationalizations of any ICT application by any method

whatsoever. In contrast, integrative ICT assessment and design approaches develop a normative view of technology and society, interpret their object of study as starting point for improving technology and society according to their normative criteria, and use every method promising to shed light on causes and conditions that further or hinder meeting of normative criteria. They feed the assessment of the impact of the Internet back to the design of the Internet. Only this kind of approach can be considered "critical."

2.2 The Dynamic of the Internet over Time

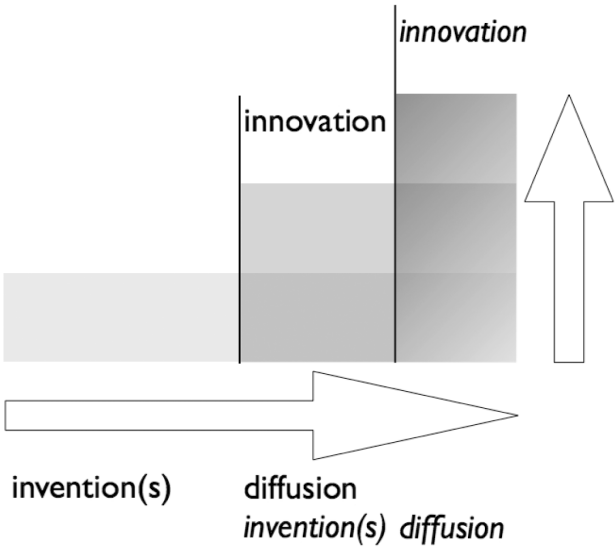
Viewing the Internet as a self-organizing system means that it undergoes evolution. The dynamic of the self-organizing Internet as a techno-social system—so far described in terms of synchronicity, that is, in terms of interdependence of hierarchical levels—leads to changes in the overall quality of the system if seen in an evolutionary perspective, that is, in terms of a temporal succession of phases. This evolution can be looked at from different levels.

In making use of Schumpeterian distinctions, it can be stated that, in the course of techno-social evolution, new kinds of technology invented in phases of normal development may or may not transform into innovations. Innovations mark leaps in quality that introduce phases of diffusion of the new kinds of technology. Phases of diffusion can again be seen as phases of normal development which yield new kinds of inventions (see Figure 8).

Whether or not an invention becomes an innovation depends on societal factors outside the internal technological dynamic, in particular economic factors. When it comes to an innovation, the whole sociosphere is by diffusion worked through and adapted accordingly. In terms of the stage model shown in Figure 8 this means that the lower stages insofar as they build the basis of the new stage are reworked so as to fit the emerging quality of the new whole. In that case the notion of revolution is properly applied to societal evolution. Revolutions mark the changes of quality of the societal system in the course of evolution. Revolutions change the basis of the societal system; they form a system that differs in quality from the system before. The process of such a transformation as well as the result of such a transformation might be called a "social formation," to employ a term from Marxist tradition. If technology triggers social change, if it is deeply intertwined with these transformations, then we would be justified in naming them "techno-social formations" (see Figure 9).

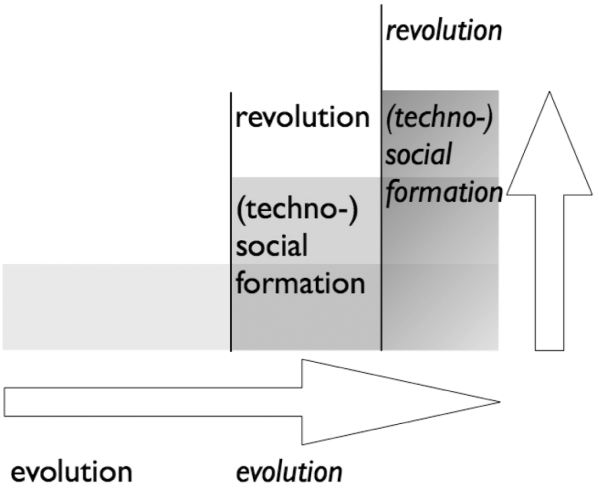
There have been many arguments for looking on history as a sequence of techno-social formations brought about by revolutions that build on these

Figure 8 The Dynamic of Techno-social Self-organization over Time



formations while at the same time restructuring them: the neolithic revolution, which was a shift from nomadism to sedentariness with crop growing and cattle breeding, introduced the techno-social formation of agricultural society; the industrial revolution drew on machine tool inventions of engineers and coupled them by transmission mechanisms with energy providing engines like the steam engine so as to result in work machines which gave rise to the techno-social formation of industrial society; and, in the words of Marshall McLuhan, "after we had extended our bodies in space" in the ages of mechanical technology, by means of "electric technology," better: by means of the scientific-technological revolution in digitization, we are on the point of extending "our central nervous system itself in a global embrace, abolishing both space and time as far as our planet is concerned" ([1964] 1997, 3), enhancing the control of material production as well as supporting all information processes in social systems, thereby ushering in the techno-social formation of informational society. Each new formation subjugated that from which it departed: the agricultural society increased

Figure 9 The Dynamic of (Techno-)Social Self-organization over Time

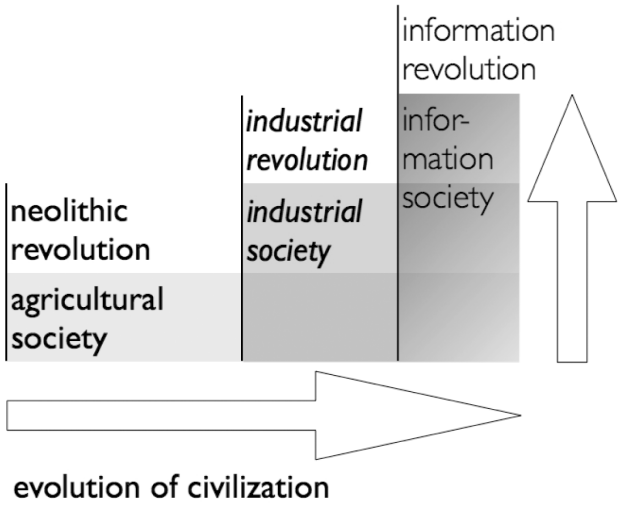


the control of natural resources like plants and animals, the industrial society has been industrializing agriculture, and the informational society is informatizing industry (see Figure 10).

Manuel Castells (1998, 2001, 2004) is the most influential theorist of the information age. His theory can easily be interpreted in the light of the evolutionary-systemic approach presented here. For according to him what is central is the potential of ICTs to foster network organizations. Thus society of today is the result of an interplay of several processes—one to be located in the inner dynamic of technology, the other in the dynamic of the technology-society relationship. In society so far networks have been co-present with non-network organizational patterns, or hierarchies, that have proven more efficient given the state of the art of technological development. Since the development of computerized ICTs like the Internet, however, those network organizations become increasingly capable of outperforming traditional hierarchies. Hence Castells calls the emerging society "network society."

The granularity of this view of human history is already less fine than that of technological innovation cycles. The underlying dynamic, however, is the same. Evolutionary systems thinking assumes an evolutionary linkage

Figure 10 The Dynamic of Human Self-organization over Time

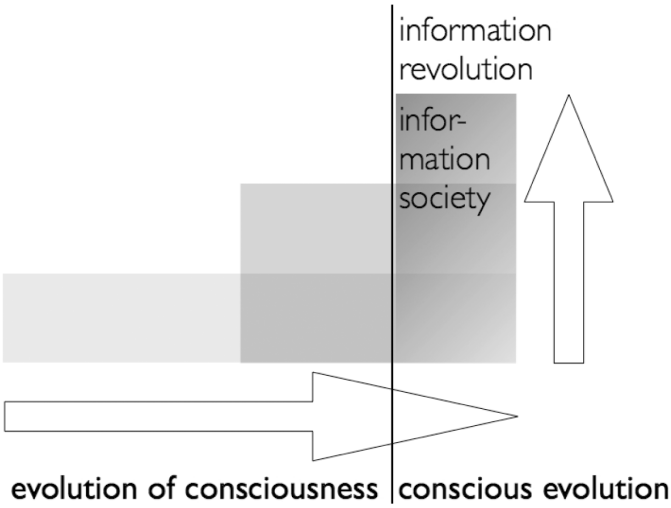


between human history and natural history. Therefore there is far less granularity but by it is by no means less meaningful. On a mega-level, there is a mega-evolution of which the development of the Internet and the evolution of society are part and which constitutes the ground from which they emerged. This mega-evolution is a process that bears a tendency toward ever higher intelligence starting with the most rudimentary system that is able to stabilize, maintain, and perpetuate itself, to adapt to changes from the outside and to make the outside subject to its goals, to wit, to organize itself—a process culminating so far in the advent of the Internet:

> In principle, this process does not differ from the evolution of primitive nervous systems into advanced mammalian brains . . . each node, rather than being a neuron, is a person comprising trillions of neurons . . . coupled . . . to their personal computers . . . We are now dealing with the very top end of the known spectrum of intelligence." (Stonier 1992, 105)

Seen from this point of view, Internet, computer, ICTs at large, provide the material underpinnings for raising collective intelligence of human

Figure 11 The Dynamic of Self-organization over Time



societies at the global level, for helping produce global consciousness of a world society to come—this material underpinning being a "global brain." To put this idea in an even bigger picture—which Tom Stonier would certainly have appreciated—the idea of a global brain becomes functional when viewed in the context of a possible transformation of the evolution of consciousness into conscious evolution (see Figure 11). Béla H. Banathy, the advocate of social systems design, takes as his point of departure a quotation of Jonathan Salk (1983, 112): ". . .human beings now play an active and critical role not only in the process of their own evolution but in the survival and evolution of all things." As Banathy adds in 2000 (203): "If we accept this responsibility and engage creatively in the work of evolution we shall . . . be the designers of our future, we shall become the guides of our own evolution and the evolution of life on earth and possibly beyond." This becomes crucial, in particular, because society has to be empowered to cope with global challenges in several respects. Society has to be endowed with a means of enhancing its problem-solving capacity regarding the challenges it is confronted with; society has to be enabled to meet the growing demand for governance in the face of tendencies of fragmentation, heterogenization, and disintegration.

2.3 The Dynamic of the Internet Today

Now, having said all this, it becomes clear that an answer to the question we started from—the question of convergence or divergence in social affairs as emerging along with the Internet—must relate to the endogenous and exogenous processes driving the self-organization of the Internet as a subsystem of society which is itself another self-organizing system in the course of cosmic evolution. In the most general terms, the evolution of self-organizing systems shows an ongoing oscillation between proceeding differentiation and counterbalancing integration by which simplicity catches up with rising complexity. This suggests convergence, albeit on a high level of divergence. From an evolutionary systems theory point of view, society is but another self-organizing system that constitutes that step in the overall evolution which represents the most sophisticated form of information generation ever known. Over and above that, the issue can be raised as to whether by means of electronic networking, i.e. the linking of humans and computers together, this form of social information processing will undergo a transformation to a new and higher level. Thus the question is, will a global brain not only be capable of monitoring the manifestations of crises in the socio-economic, environmental, and technological spheres, but also enable humans to set the world society on a path toward sustainable development which would be tantamount to a leap in societal self-organization?

Those who argue in favor of the thesis that the spread of computer-linked telecommunications will provide the hardware of an emerging global nervous system and brain, point out that after the inventions of speech, writing and the printing press the diffusion of modern ICTs is setting the stage for extending human collective intelligence into novel socio-technical forms that might regain the inter-connectedness of bacteria (Bloom 1999), if not transcend both the intelligence of humans and machines of today by an even greater degree than human information processing systems transcended pre-human ones (Haefner 1991). The introduction of each of the series of information technologies created closer and closer links between individuals and groups of individuals as elements and subsystems of different social systems. The same applies to the introduction of electromagnetic communication technology and computerization which however create interdependence at a planetary level.

It is certainly true that change in quantity is only a necessary but not a sufficient precondition for change in quality (Fleissner and Hofkirchner 1998). Interdependence is but an intermediate step, if that, toward integration, but not integration itself. Like the qualitative leap dividing phenomena

at the physiological level (that is, brain phenomena like electrical and chemical neuronal activity) from those at the psychological level (mind phenomena like states of consciousness and conscience), there is a jump required from the interconnectivity of intelligent nodes in the global network, to the "software" of something like a mind of global society. Furthermore, the software to be run by the super-organism of a future world society must be able to sense, interpret, and respond (Stock 1993, 80-91), but currently, it lacks reason and therefore cannot do so. Societal development in this phase of transition 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 humanity (postulated time and again in models since the enlightenment); between the reality of globalization and the ideals of humanity, evolving a global mind including self-awareness, consciousness, and conscience (Richter 1992). Present-day societies lack the intelligence, logistics, and organizations which they need to secure their material reproduction, and to plan and carry out strategies which would set the world on a path toward sustainable development. Such development would go about solving problems such as the use of force for political means, the gap between rich and poor (both nations and individuals), and damage caused by pollution and extraction of raw materials. This obvious capacity for self-destruction is a sign that the global development of society has entered a decisive phase—a phase in which the degree of complexification and differentiation it has reached can be compensated for only by the opposite trend of simplification and integration into a newly-created supersystem. Contrary to evolutionary information-processing systems on the pre-human level, the kind of self-organization which is needed to overcome the crises in question requires actions of conscious individuals, and will not emerge from technological progress alone (Laszlo 1989).

This overall assessment of the Internet as part of the evolution of self-organizing systems has strong implications for the Internet as part of societal evolution. It must be acknowledged that the Internet today advances both opportunities and risks. It is society that has to shape technology in such a way that it has desirable effects. A desirable effect is that the Internet is networking individuals, organizations, institutions, and societies at a global level and thus provides the glue by which cohesion of the emerging world society can be supported. The Internet provides the material underpinning of the consciousness that is inherent in the social system that may emerge. Eventually, its role may be that of a catalyst of global consciousness in a global society. But at the same time, it catalyzes existing social antagonisms.

Concerning the relationship of Internet and society one can say that the Internet does have antagonistic social effects; it produces various tendencies that contradict each other and run counter to each other (Hofkirchner and Fuchs 2003, Fuchs and Hofkirchner 2003). In the Internet society the antagonistic character of the relationship of Internet and society can be found over the whole range of subsystems of society: in the technosphere as antagonism between alliance technology and the Megamachine, in the ecosphere between computer-supported sustainability and computer-supported degradation of the environment, in the economy between information as open-source good and as monopolized commodity, in the polity between e-democracy and Big Brother, and in culture between computer-supported wisdom and computer-supported manipulation (Hofkirchner and Fuchs 2003; Fuchs 2003).

This assessment of the Internet as part of societal evolution entails, in turn, an assessment of the inner dynamic of the Internet as a techno-social self-organizing system. The concrete form Internet applications exhibit today, the current tendency of the technological development and the social context of Internet are contingent—that is, to paraphrase Luhmann's theory in a nutshell: it is like it is but it could be different. The emergence of "produsers" who design "their" Internet according to their desires by which community-building is enhanced and civil society is strengthened is counterbalanced by the dominance of business and state interests. None of these trends, however, seem to promote either convergence or divergence. The trend of fostering communities does not rule out the fact that it is a plurality of communities which may have little in common. Commercialization, on the other hand, which allegedly facilitates variety and diversity through customization may end up in standardization that subjugates personal freedom.

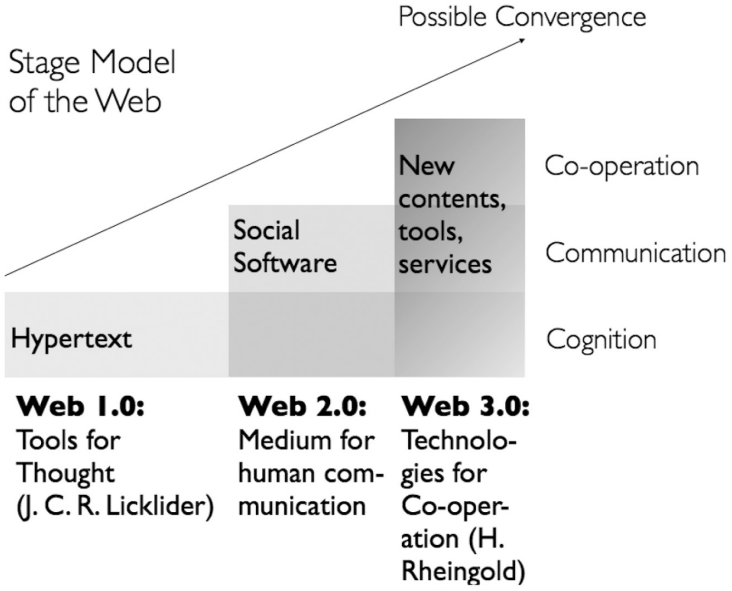
Now, the scheme of innovations that make inventions diffuse among society may serve as a background against which the current development of the Web might be sketched. Hüser and Grauer (2005, 92), for example, identify a sequence of stages of Internet development from a research network—Advanced Research Projects Agency (ARPA)—through email through World Wide Web through mobile services to embedded services (ambient intelligence as a network of things). Thereby interpersonal communication was replaced by human-machine-communication which in turn will be replaced by machine-machine-communication. Unfortunately, this categorization is technology-biased. To understand evolutionary developments of the Internet, we have to be aware of the nature of Internet as a techno-social system in which certain societal functions are technologically augmented, supported, and mediated. What is technisized, digitized, in the case of ICTs is information processes in society. Information processes occur in three

different forms: in the form of cognition processes, in the form of communication processes, and in the form of co-operation processes that we have discussed elsewhere (see e.g. Hofkirchner and Ellersdorfer 2005). These processes relate to each other in a certain way which reflects and resembles the build-up of a complex system. One is the prerequisite for the other in the following way: to co-operate you need to communicate and to communicate you need to cognize. These processes thus represent one important dimension by which steps in the Internet's evolution have to be assessed.

Currently, there is much talk of "Web 2.0" and "Social Software" which are said to equal, or at least correspond to, each other. What is suggested is a phase of Internet development which leaves behind static websites which were characterized by hypertext and ushers in new possibilities for knowledge management, e-learning, and knowledge technologies in general and for virtual communities to form. But there are two types of communities, though they are sometimes difficult to distinguish: one in which individuals just communicate and another in which individuals, beyond that, share certain values which makes them co-operate, that is, collaborate and act together in real life situations. The first type might be called community of interest, the second type community of action. Communities of interest work together in developing those Web 2.0 platforms which are primarily designed for cognitive (elearning 2.0, Wikipedia, etc.) or communication (MySpace, etc.) purposes. In that respect, these communities of interest co-operate. They jointly produce open source, open content, open resource for education, and so on.

"Social Software" comprises both community types but does not particularly focus on the second type. This second type of community is, however, what is needed to work out collective intelligence and accomplish that leap in quality that is required to move societal development onto a sustainable path. Collective intelligence is the capability of a collective to show intelligent behaviour that goes beyond the capability of each of the participating actors. This phenomenon is because of the systemic effect of synergy. It gains importance nowadays, because sociologists point to the rising complexity of social life. The problem-solving capacities have to catch up with the complexity of the problems. This is in particular true with respect to global challenges. The Internet can and ought to play a major role in raising collective intelligence. If it is stated that the next step required to take to enhance collective intelligence is extending co-operation in cyberspace with the aim of enhancing co-operation in the real world—and not only communication or cognition as was done so far—then communities of interest can be looked on as foreshadowing communities of action supported by means of the Internet and directed toward coming to grips with global challenges and

Figure 12 The Dynamic of the Techno-social Self-organization of the Internet over Time



the complexity of social life. The kind of co-operation communities of interest exercise can and has to be generalized and extended to communities of action. This is Bloch's Not-Yet applied to the current development of the Web and the issue of convergence of society. Hence—inspired by Howard Rheingold's writings and the visions of James C. R. Licklider—the history, the actual development and the possible and desired new leap in the quality of the evolution Internet might be hypothesized as shown in Figure 12.

To conclude, there might be convergence in society brought about by future developments of the Internet. But this will happen only if it is conceived as a Not-Yet by a considerable number of humans. As Castells pointed out at the end of his trilogy:

> The dream of the Enlightenment, that reason and science would solve the problems of humankind, is within reach. Yet there is an extraordinary gap between our technological overdevelopment and our social underdevelopment.

> Our economy, society, and culture are built on interests, values, institutions and systems of representation that, by and large, limit collective creativity, confiscate the harvest of information technology, and deviate our energy into self-destructive confrontation . . . If people are informed, active, and communicate throughout the world; if business assumes its social responsibility; if the media become the messengers, rather than the message; if political actors react against cynicism, and restore belief in democracy; if culture is reconstructed from experience; if humankind feels the solidarity of the species throughout the globe; if we assert intergenerational solidarity by living in harmony with nature; if we depart from the exploration of our inner self, having made peace amongst ourselves. If all this is made possible by our informed, conscious, shared decision, while there is still time, maybe then, we may, at last, be able to live and let live, love and be loved. (Castells 1998, 390)

A Critical Information Society Theory will contribute to this awareness. To do this properly, it has to be well founded in Critical Social Systems Theory, in Evolutionary Systems Theory, and in Dialectics.

Notes

1. I hesitate to call this dynamic "mechanism" like Bunge. The reason is that I want to stress the importance of avoidig notions that resemble mechanistic thinking. It is also Bunge's intention not to point out that the respective processes by which a system qualifies as system are mechanical in the sense of mechanistic thinking. Therefore I prefer to use the notion of "dynamic" which links up to the wide-spread notion of "dynamic systems" by which complex systems are denoted.

2. While appreciating every social science approach that acknowledges the social nature of technology, I find the notion of "socio-technological systems" misleading in that it seems to insinuate that there are technological systems which form a category and that there are socio-technological ones which form a subcategory of the former. It is rather the other way around. Technological systems are subsystems of social systems. Therefore I am inclined to coin the term "techno-social systems."

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