

The Nature-Society-System and the Global Sustainable Information Society (GSIS)

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Abstract

The approach suggested in this paper argues that sustainability is a multimodal issue having an ecological, a technological, an economic, a political, and a cultural dimension. Existing sustainability indicators lack aspects of information and ICT, existing information society indicators lack aspects of sustainability. What is needed are indicators that measure the degree to which a sustainable information society has been achieved in the various societal dimensions.

1 Nature and Society

There are four logical possibilities for conceiving the relationship of nature and society: For reductionism nature and society are identical and nature determines society. Projectionism conceives nature and society as identical and society as the determining factor. Projecting society into nature results in anthropomorphism. Dualism conceives nature and society as non-identical and radically different. A dialectical position sees nature and society both as identical and non-identical.

Niklas Luhmann [2004] argues that a system forms its border by the system/environment-difference, that society is the all-enclosing social system of communications and that nature forms the environment of society. His approach is based on an ontology that considers systems as self-centred, endogenous, and closed, there are no causal relationships between systems, only irritations and disturbances. "The relationship of system and environment is constituted by the system's closing off its self-reproduction against the environment by internal circular structures and by being only exceptionally – only on other levels of reality – irritated, built up, and put into oscillation. We term this case resonance" [Luhmann, 2004: 40]. For Luhmann systems are not open, interconnected, in complex causal relationships, and in processes of exchange, contact between a system and its environment is only considered as an exception from the rule and as a very weak disturbance for the normal systemic functioning. Based on such a dualistic concept of system and environment, Luhmann can neither explain how ecological problems are caused nor how they could be solved, he is only interested in how society communicates about ecological problems (ecological communication) and argues that ecological problems are only problems because society communicates them as problems [Luhmann, 2004: 63] which suggest a radical constructivist perspective that doubts the existence of real problems. In such an approach ecological problems are not real, but only constructed.

Christoph Görg [2001] argues that Luhmann has stressed in later works that nature and society are structurally coupled [Luhmann, 1997: 130] and that hence Luhmann has accepted causalities between the two systems. Structural coupling does not imply a stronger form of causality than Luhmann's concept of resonance because this notion that stems from Maturana and Varela means that the environment can't determine structural transformations of a system, but can

only cause perturbations. This concept operates like Luhmann's theory in terms of closed, autonomous, differentiated systems.

Luhmann's main argument is that modern society is functionally differentiated, i.e. it is organized in the form of autonomous subsystems where each fulfils a specific function that is based on a specific dual code and a specific programme. Such systems are operationally closed. He tries to show that none of these subsystems (he mentions economy, legal system, science, polity, religion, education, and ethics and devotes one chapter for each system) is responsible, appropriate, or competent for dealing with ecological problems or solving them because all of them would be concentrated on their own system-specific problems and operations that would leave no place for external problems. In case of the economy Luhmann argues that this system is only interested in prices and hence deals only with ecological problems if they can be expressed in the language of prices. Luhmann simply ignores that the economy is the system where the metabolism between society and nature is organized and that the industrial form of economic production has resulted in global ecological problems. There simply seems to be no solution for ecological problems for Luhmann and he seems to be willing to accept them as irrevocable reality. Luhmann tells us that ecological problems are simply too complex to be solved by society and that problem solution by specific subsystems would be determined to fail because these systems would be functionally differentiated and would by attempting solutions try to act as centres of society which would generate new problems. Luhmann's systemic fatalism is ignorant and ideologically distorted. The Green movement and the New Social Movements earn only scorn and derision in Luhmann's account of ecological problems, he argues that they protest against functional differentiation, are self-righteous, lack theory, have no real solutions, name only enemies, stir up and communicate fears. In the end Luhmann argues that he doesn't want to explain how ecological communication could contribute to a solution of ecological problems and that there can be no privileged location in society that can formulate norms, rules, or guidelines for the solution of these problems [Luhmann, 2004: 249]. Luhmann's dualistic systemic approach can't explain how society and nature are related, how in modern society this relationship generates problems, and it doesn't contribute any insight to possible solutions. The function of Luhmann's theory for society is that it is completely useless. Luhmann's insight is that nothing can be done because society functions as it functions, he is blind for the insight that social and ecological problems are due to the antagonistic dysfunctions of modern society and that more far-reaching social changes are needed. In contrast to Luhmann I want to put forward a dialectical systemic model of the nature-society-relationship.

Nature is the universal system of self-organizing matter. Theories of self-organization put forward a dynamic concept of nature. Self-organization is a process where a system reproduces itself with the help of its own logic and compo-

nents, i.e. the system produces itself based on an internal logic. Self-organizing systems are their own reason and cause, they produce themselves (*causa sui*). In a self-organizing system new order emerges from the old system, this new order can't be reduced to single elements, it is due to the interactions of the system's elements. Hence a system is more than the sum of its parts. The process of the appearance of order in a self-organizing system is termed emergence. The self-organization of matter as an active and productive process produces different organizational levels of matter (such as physical matter, biological matter, and society) that are organized in a systemic hierarchy in which upper levels have new emergent qualities that distinguish them from lower levels. Hence there is an evolutionary hierarchy of matter that ascends from the abstract to the concrete, self-organization on upper levels is richer in qualities than on lower levels. Society is a level of the self-organization of matter that is characterized by active, self-conscious, creative, imaginative being. Social self-organization just as the physical and biological one is dynamic, self-referential, and circular, but self-conscious cognition, communication, and co-operation is the quality that makes a difference between society and nature. Society is a specific product of the self-organization of matter that accords to its own dialectical laws of movement and to a certain respect shares general dialectical principles.

As organizational level of matter society is part of nature, but it also possesses qualities that can't be found in biological and physical matter. Hence it is a higher-level system that encompasses and encapsulates parts of biological and physical nature. Those parts of nature that are appropriated by man form a specific subsystem of society, the eco-system, that encompasses the biological and physical environment of human societal activity. Society and culture are a sublation of nature, nature and society are dialectically connected. When we speak about nature we always speak about systems that are observed and changed by human beings, nature is part of society, for human beings there can be no observation of and encounter with nature from the outside of society. The relationship of nature and society/culture is neither exclusive nor inclusive in character, i.e. nature and society are neither fully different nor fully identical. Nature is the totality of systems in the universe and their interactions, it is material and organizes itself on various levels, i.e. it consists of various evolving, interconnected system types. Systems of one type are interconnected and connected to systems of other types, hence nature is relational and dynamic in character. Society is the realm of human activity and interaction, it forms one specific, small part of nature. But for human beings this small part of the universe forms their overall context of activity. All human activity and observation takes place within society, there is no position of humans external to society. Hence nature as physical realm of activity of human labour, production, and communication is itself a part of society, in transforming and observing nature in economic, technological, cultural, and scientific processes, the human being integrates nature into society. Hence there is no relationship between nature and human beings external to society, all metabolic and observational processes that establish a relationship between nature and human beings function within society. Nature as human realm of activity is one subsystem of society that can be termed eco-sphere. Nature has produced the human being and society, but the human being integrates (certain parts of) nature as a subsystem of society into its own sphere of activities. Hence when we speak about "nature and society" we speak about society as the total realm of activity on the one hand where we focus on social interactions between human

beings and about the eco-sphere as the interaction processes between humans and ecology and the interaction processes between physical systems that are observed by human beings. Society is a sublation of nature, in production humans consume natural forces, hence nature is a foundation of society and continues to exist in society, and they transform nature in such a way that use values and social relationships emerge that have a specific social function that doesn't exist in nature as such.

Society is a self-organizing system that is based on the mutual production and interconnection of social actors and social structures (figure 1, for a more detailed discussion cf. Fuchs [2003a, b]). In this respect structures are medium and outcome of social actions, they both enable and constrain social actions. This idea corresponds to saying that social systems are re-creative, i.e. self-organizing social systems. Social systems are a sublation of natural systems: they have qualities that they share with biological systems (self-reproduction, self-structuring) and physical systems (self-structuring) and they have emergent qualities that can neither be found in bio-systems nor in physical systems, i.e. they are based on creative human actions that can based on the enabling and constraining effects of human history make choices on how to creatively design social structures. Social systems are self-structuring, self-reproducing, and re-creative.



Figure 1: Societal self-organization

The self-organization cycle of nature and the self-organization cycle of the socio-sphere are mutually connected in a productive cycle where natural self-organization serves as the material foundation that enables and constrains social self-organization and human production processes transform natural structures and incorporate these very structures into society as means of production (technologies, raw materials) (cf. fig. 2). Nature can exist and self-organize without society, society can't exist and self-organize without a natural base, the eco-sphere as the socially constructed part of nature is shaped and transformed by society. The economy is that part of the socio-sphere where the relationship between nature and the socio-sphere is established: In the economic system nature is appropriated in the form of means of production that are applied and transformed by human labour in such a way that use values that satisfy human needs are produced and can be distributed, circulated, and consumed. Hence it makes sense to argue that the economy is more material and fundamental in character than polity and culture and that it forms together with the eco-sphere and the techno-sphere the material foundation of society. In the relationship of nature and society, human actors (society) form objective structures, they externalize and objectify their labour power in social processes that result in material objects (use-values). Hence the process of the production of use-values is a process of objectification of the subjective. Nature as objective material being enters society in the form of raw materials, technologies, and use-values that are consumed as the foundation of production that is appropriated by nature and incorporated into human labour practices and experiences. Hence this process is a

process of subjectification of the objective/material. The whole self-organization cycle that connects society and nature hence is based on a dialectic of the subjective (labour power, social relationships) and the objective (natural forces, technologies, raw materials, use values), the objectification of the subjective and the subjectification of the objective. The socio-sphere can be considered as the subjective and the ecosphere as the objective aspect of the society-nature-system. A dialectical view on nature/society assumes that nature is the foundation of society, that there is a continuous metabolism between nature and society, and that society has emergent qualities that distinguish it from nature.

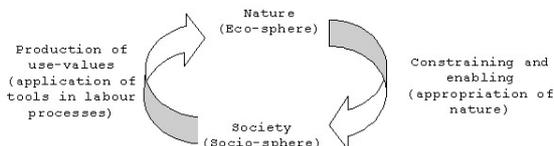


Figure 2: The dialectical relationship of nature and society

2 The Notion of Sustainability

An anticipation of the idea of sustainable development can be found in Marx's writings. He argues that in communism the globe must be improved by human beings and passed on to succeeding generations in such a condition. "From the standpoint of a higher economic form of society, private ownership of the globe by single individuals will appear quite as absurd as private ownership of one man by another. Even a whole society, a nation, or even all simultaneously existing societies taken together, are not the owners of the globe. They are only its possessors, its usufructuaries, and, like *boni patres familias*, they must hand it down to succeeding generations in an improved condition" [Marx, 1894: 784]. If one compares this passage to the most common definition of sustainable development by the Brundtland Commission – "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [WCED, 1987: 43] – one finds a striking concurrence.

In 1992 the UN Conference on Environment and Development ("Earth Summit") took place in Rio de Janeiro, Brazil, where for the first time heads of state from all over the world gathered to discuss problems of sustainability. At the Earth Summit all participating countries agreed to the Rio Declaration on Environment and Development that put forward 27 principles for the future that can help in achieving sustainable development. The discourse on sustainable development shows a shift from the view of nature as an enemy that must be controlled to a view that considers nature as an important pre-condition of human existence that must be treated carefully. In 2002 the World Summit on Sustainable Development (WSSD) conference was held in Johannesburg with the intention of having a review ten years after the 1992 Rio Earth Summit. The outcomes include a Plan of Implementation and the Johannesburg Declaration on Sustainable Development. Whereas the Earth Summit focused on the environmental issues of sustainability, the WSSD conference more effectively integrated economic and equity issues into the discussion.

In the discourse on sustainability there has been a shift from a focus on ecological issues towards the inclusion of broader societal issues. The "triangle of sustainability" introduced by the World Bank has been very important in shifting discussion on sustainability from purely ecological aspects towards more integrative concepts. Ismail Serageldin, then

vice-president of the World Bank, identified an economic, a social, and an ecological dimension of sustainability. "It is not surprising that these concerns reflect the three sides of what I have called the "triangle of sustainability"-its economic, social, and ecological dimensions" [Serageldin, 1995: 17]. It has now become very common to identify an ecological, an economic, a social, and an institutional dimension of sustainability (as e.g. the EU and the UN do). "At the time of Rio, sustainable development was mainly about protecting nature, but now, in the wake of Johannesburg, it is first and foremost about protecting people" [World Summit on Sustainable Development, 2002: 22].

In the relationship of nature and society human beings and groups act as subjects that appropriate and change nature in different ways. Although nature is active itself (it produces itself permanently in autopoietic cycles), it is an objective structure in society that is changed by man and enables the latter's activity. Hence one can conceive human individuals and groups as subjects and natural resources as objects in the nature-society-relationship. One can distinguish four types of sustainability concepts based on where in the nature-society-relationship they locate sustainability. Ecological reductionistic approaches define sustainability primarily in ecological terms, social projectionism considers sustainability as a quality of social systems, dualistic approaches speak of both a sustainable ecology and a sustainable society, but they consider both realms to be independent. Ecological reductionism ignores social aspects of sustainability such as wealth, participation, and wisdom, social projectionism is ignorant of the relative autonomy of nature, dualistic approaches ignore the interconnectedness and interdependence of nature and society. Dialectical approaches on sustainability try to solve the problems of these concepts by arguing that societal sustainability requires ecological sustainability and ecological sustainability societal sustainability, the two systems mutually enhance each other.

Approach	Nature (Object)	Society (Subject)
Ecological Reductionism	Sustainability of Ecology	
Social Projectionism		Sustainability of Society
Dualism	Sustainability of Ecology	Sustainability of Society
Dialectic Thinking	Interconnected Sustainability of Ecology and Society	

Table 1: A Typology of Approaches on Sustainability

Both nature and society are self-organizing systems in the sense that they permanently produce themselves, i.e. their elements and unity, they are self-maintaining, self-reproducing, and (in the case of society) self-reflecting. Nature is made up of eco-systems that permanently reproduce themselves, they are living, autopoietic systems that permanently reproduce their elements and their unity. If man negatively influences nature by depleting and polluting natural resources, ecosystems are no longer able to autopoietically reproduce themselves and break down. Hence their processes of reproduction and differentiation come to a halt. Ecological sustainability means that humans appropriate nature in a way that allows ecological diversity, i.e. the autopoiesis of nature can develop in such a way that nature flourishes, reproduces its subsystems, differentiates itself and produces new qualities, i.e. new ecological life forms and subsystems.

Social systems and society are self-organizing in the sense that there is a permanent mutual production of social structures and practices of human actors. These processes are goal-oriented, i.e. humans have the ability to identify and

anticipate different paths of development, to judge which ones they consider as desirable and to act according to these wishes, values, and desires. Societal sustainability is based on the desire of all human beings to live in a fair, just, and beautiful society. All humans want to live a good life, if one desires to have a good life for oneself, one must also recognize that all humans have the right to live such a life and hence societal sustainability can broadly be defined as a good life for all. Society is made up of different, interconnected subsystems: ecology, technology, economy, polity, and culture. Sustainability is a desirable aspect that humans strive for in all of these subsystems. A sustainable society encompasses ecological diversity, technological usability, economic wealth, political participation, and cultural wisdom. Usability means that technologies are designed in a user-friendly way and support humans in achieving their goals more easily. Economic wealth means that basic needs and social security should be provided for all human beings. Political participation requires a distribution of power that enables humans to adequately influence those decisions that affect them. A culturally wise society is one that is critical, self-reflective, allows a plurality of life-styles, meanings, ways of life, and values that complement each other (unity in diversity) and finds ways to solve and manage its problems in a way that brings advantages for all. Culture is made up by various subsystems such as the mass media, science, art, education, ethics/belief systems, medicine, sports, and the system of social relationships. In these systems cultural sustainability, i.e. wisdom, has different meanings such as wise knowledge and media (mass media), truth (science), beauty and imagination (art), literacy and good skills (education), openness and unity in diversity of values and rights (ethics), health (medicine), fitness (sports), love and understanding (social relationships).

In a dialectical approach on sustainability ecological sustainability is based on social sustainability and vice versa, i.e. biological diversity is best advanced by a society where we find technological usability, economic wealth for all (i.e. a rather symmetrical distribution of wealth), political participation for all, and cultural wisdom and a biological rich and diverse ecosystem is a life-support system that is a good foundation for a socially sustainable society where one finds social systems that are usable, wealthy, participatory, and wise. An unsustainable ecosystem advances an unsustainable society and vice versa: If man pollutes nature and depletes non-renewable natural resources problems, i.e. if he creates an unhealthy environment, problems such as poverty, war, totalitarianism, extremism, violence, crime, etc. are more likely to occur. The other way round a society that is shaken by poverty, war, a lack of democracy and plurality, etc. is more likely to pollute and deplete nature. This can result in a vicious cycle where nature and society are connected in negative feedback loops that have destructive effects for both systems. If nature and society are connected in sustainable ways there can be positive feedback loops that enable both systems to flourish and to develop in sustainable ways. Sustainable development of the ecosystem means that it increases its diversity and reproduces itself, sustainable development of the sociosphere means that it increases wealth for all, fosters technological progress that benefits all, and enhances participation and wisdom for all. In a sustainable society social structures such as technology, property/use values, power, and knowledge/meaning are produced and enhanced in ways that benefit all human beings, the self-organization cycles of a sustainable society develop in such a way that a good life for all is possible, the self-organization of the ecosystem and the self-organization of the socio-sphere positively influence each other.

Dimension	Quality
Ecological Sustainability	Biological Diversity
Technological Sustainability	Usability
Economic Sustainability	Wealth for All
Political Sustainability	Participation of All
Cultural Sustainability	Wisdom
Sustainability of:	
Mass Media	Wise Knowledge and Media Truth
Science	Beauty and Imagination
Art	Literacy and Good Skills
Education	Openness, Unity in Diversity of Values and Rights
Ethics	Health
Medicine	Health
Sports	Fitness
Social Relationships	Love and Understanding

Table 2: Dimensions of Sustainability

Modern industrialism is unsustainable in two ways: 1. Accumulation processes result in the depletion of non-renewable natural resources, limits to extraction and accumulation are herewith created. 2. Economic production and consumption result in residues of goods that are shoved into nature by society in the form of waste. Hence ecological degradation includes both depletion and pollution. Based on figure 3 one can describe ecological degradation as a double process of the depletion of nature (in the direction where nature is appropriated by society) and the pollution of nature by society (in the direction where society transforms nature) (cf. fig. 3). Unsustainable ecological development is a process where depletion and pollution of nature by society cause the breakdown of more and more material (living and non-living) cycles of self-organization in nature and create threats to the survival of the whole eco-system that forms the material foundation of society. Hence the destruction of nature also threatens the survival of society and humankind.

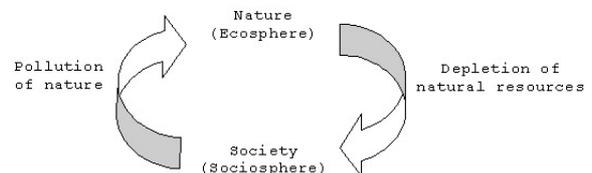


Figure 3: Unsustainable ecological development

3 Measuring the Sustainability of the Information Society

The shift towards the knowledge-based society has resulted in an increasing orientation of empirical sociological research and statistical analysis towards developing statistical indicators of the knowledge-based character of the economy and society. In order to benchmark the success of the member states in achieving the goals defined in the eEurope action plans the European Council has defined main indicators plus supplementary indicators in the areas of 1. Citizens' access to and use of the Internet, 2. Enterprises' access to and use of ICTs, 3. Internet access costs, 4. E-Government, 5. E-Learning, 6. E-Health, 7. Buying and selling on-line, 8. E-Business readiness, 9. Internet users' experiences and usage regarding ICT-security, 10. Broadband penetration (Council of the European Union 2003). There are 16 policy indicators and 25 supplementary indicators. For benchmarking eEurope 2002 there were 23 indicators. There was a World Summit of the Information Society

(WSIS) thematic meeting on "Measuring the Information Society" from February 7-9, 2005 in Geneva in which possibilities for an international unification of information society indicators were discussed. The final conclusions suggest 42 indicators in 3 areas: 1. Infrastructure and access, 2. Access and use of ICTs by households and individuals, 3. Access and use of ICTs by businesses [WSIS, 2005].

Sustainability indicators such as the Ecological Footprint, the Pilot Environmental Sustainability Index, the Living Planet Index, the early OECD core set of environmental indicators, Eurostat's Environmental Pressure Indicators, and Material Flow Analyses focus on the ecological dimension of sustainability. Many of these indicators are based on the OECD's Pressure-State-Response (PSR) model that assumes that human activities exert pressures on the environment that change the latter's state which results in responses of society in the form of policy measures.

The discourse on sustainability has shifted from an early ecological focus towards the inclusion of economic, political, cultural, and social issues. Hence there are not only ecological indicators, but also ones that try to cover the whole bandwidth of societal issues concerning sustainability. Such broad indicators of sustainability covering a wide range of topics and societal areas are e.g. the United Nations Commission of Sustainable Development's (UNCSD) set of indicators of sustainable development, Eurostat's sustainability indicators, the World Development Indicators that are based on the Millennium Declaration, the sustainability indicators suggested by the Wuppertal Institute, the Genuine Progress Indicator, and the Barometer of Sustainability.

In 1996 the United Nations Commission on Sustainable Development (UNCSD) developed a list of 134 indicators of sustainability [UNCSD, 1996]. Later the UNCSD chose to classify indicators according to thematic areas. A working list of 134 indicators was selected and 22 countries volunteered to test their applicability. The goal for 2001 was the development of a standardized set of indicators available as a tool to measure progress towards sustainable development. As such a standardization the United Nations Division for Sustainable Development [UNSD 2001] suggests a total of 57 indicators in four key areas: social, economic, environmental, institutional. Based on the UN indicators Eurostat (2001) developed 64 indicators of sustainability in the same four main areas as UNSD..

There are both indicators for measuring the information society and sustainability. But there is a lack of attempts trying to measure the progress towards a sustainable information society. If we assume that important societal changes are taking place and affecting all realms of society that are due to the increasing importance of information, ICTs, networks, and globalization, it is not sufficing to measure the degree to which society is an information society, but one also should develop indicators that show to which degree we live in a sustainable information society that provides human well-being and ecological diversity. The task of a theory of the information society is on the one hand to discuss and advance essence, principles, and dynamics of the new societal formation, and on the other hand to identify aspects and indicators of sustainability that allows stakeholders to develop guidelines for advancing the sustainable character of the information society. The information society indicators that are currently used and discussed focus on quantifying the production, diffusion, and use of ICTs in society, but they frequently lack an explicit inclusion of sustainability issues. Approaches on measuring sustainability discuss broad societal issues, but they frequently lack taking adequately into account issues of information and ICTs. Some of them simply ignore such topics, others only include

measurements of computer and Internet diffusion in society. The task at hand is to identify principles, tendencies, opportunities, risks, dimensions, and indicators of a sustainable information society, to assess and develop ideas of how to use information and ICTs in such a way that ecological, economic, social, and institutional sustainability can be advanced, and to work out indicators for measuring the degrees of sustainability of the various dimensions of the information society.

During the last decade there has been a shift from considering sustainability as a purely ecological concept to defining it in broader societal terms. Hence the discourse on ICT, knowledge, and sustainability shouldn't halt at ecological issues. I have argued that there are ecological, technological, economic, political, and cultural aspects of sustainability and that goals of sustainability are biological diversity, technological usability, economic wealth for all, political participation and justice for all, and cultural wisdom and unity in diversity management. Information and ICTs pose both new opportunities and risks in all of these subsystems of society, it is antagonistic and produces in parallel various tendencies that run counter to and contradict each other. Table 3 identifies opportunities and risks of the various dimensions of the information society. A sustainable information society is one that advances such opportunities and minimizes risks.

Depending on how ICTs are socially designed and applied they can have positive and/or negative effects on society. They can either have positive or destructive effects on the ecosystem, they can be designed in user-friendly ways or not, can be treated as free goods available to all for free or as commodities that are unequally accessed and distributed (the same is true for knowledge), can either support political participation or surveillance, can advance participatory online-media and the plurality of political information and communication or one-dimensional mass media, can foster a higher publication rate and speed in science (scientific online journals and reviews) or have due to the increasing publication speed negative effects on quality standards provided by the peer-review system, can put forward new forms of art (cyberart, electronic art) that involve audience-participation or have negative influences on the authenticity of artworks, they can support more co-operative or more individualized forms of learning and ethics, can foster both cultural diversity or fundamentalism, can have positive or negative effects on health and medical awareness, can advance and socialize or individualize and limit physical activity and games, and they can be helpful in advancing friendships and love or the sowing of hate (as in the case of right-wing extremists using the World Wide Web). In all cases today ICTs and information don't either have solely positive nor solely negative effects, but both positive and negative ones at the same time. There are enabling and constraining tendencies of ICTs and information in society and ecology today, it is a political task to advance and realize opportunities and to avoid risks that are related to ICTs.

Dimension	Quality	ICT- and Information-related Opportunities and Risks
Ecological Sustainability	Biological Diversity	Ecologically Sustainable vs. ecologically destructive ICTs
Technological Sustainability	Usability	User-oriented, user-friendly, enabling vs. Unusable, constraining ICTs
Economic Sustainability	Wealth for All	Free knowledge and ICTs vs. Knowledge and ICTs as commodity and private property
Political Sustainability	Participation of All	Participation vs. Control enabled by ICTs
Cultural Sustainability Sustainability of:	Wisdom	Wisdom vs. False Consciousness advanced by ICTs
Mass Media	Wise Knowledge and Media	Participatory, wise Online-Journalism vs. Manipulative, one-dimensional Online-Journalism
Science	Truth	Speed vs. Quality of E-Science
Art	Beauty and Imagination	Aura Gain and participatory art vs. Aura and authenticity loss of works of art in cyberspace
Education	Literacy and Good Skills	Co-operative vs. Individualized E-Learning
Ethics	Openness, Unity in Diversity of Values and Rights	Open VS. Fundamental Cyberethics
Medicine	Health	Positive vs. Negative effects of ICTs on health
Sports	Fitness	Advancement/socialization vs. limitation/ individualization of physical activity and games
Social Relationships	Love and Understanding	Cyberlove vs. Cyberhate

Tab. 3: Dimensions of the Sustainability of the Information Society

References

- [Council of the European Union, 2003] Legislative Acts and other Instruments: Council Resolution on the Implementation of the eEurope 2005 Action Plan. Council of the European Union, Brussels, 2003.
- [Eurostat, 2001] *Measuring Progress Towards a More Sustainable Europe. Proposed Indicators for Sustainable Development*. Office for Official Publications of the European Communities, Luxembourg, 2001.
- [Fuchs, 2003a] Christian Fuchs. Some Implications of Pierre Bourdieu's Works for a Theory of Social Self-

Organization. *European Journal of Social Theory*, 6(4): 387-408, 2003.

- [Fuchs, 2003b] Christian Fuchs. Structuration Theory and Self-Organization. *Systemic Practice and Action Research*, 16(4):133-167, 2003.
- [Görg, 2001] Christoph Görg. Risiko Gesellschaft. Naturverhältnisse in der Theorie Luhmanns. In Alex Demirovic, editor, *Komplexität und Emanzipation*, pages 255-288, 2001. Westfälisches Dampfboot, Münster.
- [Luhmann, 1997] Niklas Luhmann. *Die Gesellschaft der Gesellschaft*. Suhrkamp, Frankfurt/Main, 1997.
- [Luhmann, 2004] Niklas Luhmann. *Ökologische Kommunikation*. Verlag für Sozialwissenschaften, Wiesbaden, 2004.
- [Marx, 1894] Karl Marx. *Das Kapital. Band 3. MEW, Vol. 25*. Dietz, Berlin, 1894.
- [Serageldin, 1995] Ismail Serageldin. The Human Face of the Urban Environment. In Ismail Serageldin, Ismail et al, editors, *Proceedings of the Second Annual World Bank Conference on Environmentally Sustainable Development*, pages 16-20. World Bank, Washington, D.C., 1995.
- [United Nations Commission for Sustainable Development (UNCSD), 1996] *Indicators of Sustainable Development Framework and Methodologies*. United Nations, New York, 1996.
- [United Nations Division for Sustainable Development (UNSD), (2001)] *Indicators of Sustainable Development: Guidelines and Methodologies*. United Nations, New York, 2001.
- [World Commission on Environment and Development (WCED), 1987] *Our Common Future*. Oxford University Press, Oxford, 1987.
- [World Summit on Sustainable Development, 2002] *The Jo'burg Memo. Fairness in a Fragile World*. Heinrich Böll Foundation, Berlin, 2002.
- [World Summit on the Information Society (WSIS), 2005] *WSIS Thematic Meeting on "Measuring the Information Society"*. Geneva, 7-9 February 2005. Online: <http://www.itu.int/wsis/docs2/thematic/unctad/final-conclusions.PDF>