The Memorandum
"Sustainable Information Society"

Wolf Göhring1 *

Overview
The working group “Sustainable Information Society” (GIANI) in the specialized committee “Umweltinformatik” of the German Gesellschaft für Informatik (GI) wrote a memorandum on the "Sustainable Information Society" which appeared in summer 2004. The working group was founded during the 12th symposium „Computer Science for Environmental Protection“ held in Bonn in the year 2000. GIANI started to write the memorandum at the beginning of 2002 which is limited to civilian applications. On considering military applications, this would have gone beyond its scope. In an appendix some aspects of the memorandum — life-cycle of ICT infrastructure, the data world, computer and education, the precautionary principle in the Information Society, roadmapping — are deepened (Dompke et al. 2004, 41—58). The memorandum is addressed to:

- Scientists in computer science, in other disciplines concerned with ICT, and in the areas of Sustainable Development.
- Teachers and students in the educational facilities of all stages.
- The media, interested public, economists and the respective politicians.

1. The Spectrum of Digital Technologies
The memorandum refers to the entire spectrum of digital technologies — from the Personal Computer, the mobile telephone up to the microprocessor in the washing machine, the MP3-player in the wrist-watch and the smart label at the freight container. During the rapid development of the Information and Communication Technology (ICT) more and more programmable chips are embedded into other articles, where one notices them scarcely. Today, already 98 % of the microprocessors are

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1 Fraunhofer Institute for Autonomous Intelligent Systems, Schloss Birlinghoven, D-53754 Sankt Augustin. wolf.goehring@ais.fraunhofer.de, http://www.ais.fraunhofer.de/~goehring

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embedded. The vision of pervasive computing means, that processors wireless interlaced, equipped with sensors and scarcely perceptible are embedded in many objects of daily use. In the past 15 years about 600 million humans found access to the Internet — these are approximately 10% of the world’s population. IBM predicts that in 10 years a billion humans will use one trillion “intelligent” articles.

2. **Chances and risks**

The penetration of the everyday life with ICT will have effects on individuals, society and environment. The ever broader usage of ICT does not favour automatically a sustainable, environmentally fair development. The question arises under which conditions this development would be compatible with a Sustainable Development and wether it would help to come nearer to this goal.

The memorandum should encourage to present to the public the results of research and the examples of a “good practice” which could lead to a Sustainable Information Society. On the way into a global Information Society there will arise chances and risks for the goal of a Sustainable Development. In the memorandum, the working group defines its position, presents it for discussion and recommends how to shape the way into a Sustainable Information Society. There will be a need for political decisions, if both, a Sustainable Development as well as a global Information Society should be reached.

3. **What is Sustainable Development?**


*Sustainable Development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

( Brundtland Commission)

The working group understands Sustainable Development as a *guideline* defining the direction of activities. This guideline includes normative decisions and usually leads to controversies, in which individual and cultural differences are expressed. A development that is to be understood as sustainable can be legitimized, therefore, only in a social discourse. The working group orients itself at three criteria:

- **Compatible with humans:** No damage is to be caused to individuals. The person’s dignity is to be protected.
- **Compatible with society:** The relations of humans and the resulting social system is not to be damaged. The participation should be protected.
• **Compatible with nature:** The environment is not to be damaged durably. The natural bases of life are to be retained.

These criteria reflect elementary relations of humans in the world and include the frequently used categories of economy, ecology and society (“three-column concept” in the sustainability discussion). Since economic activities affect humans, society, and nature the guidelines of economy should be compatible with them.

4. **What is Information Society?**

The UN World Summit on the Information Society (WSIS, 2003 in Geneva and 2005 in Tunis) shows the increasing interest in this topic. But there is no uniform use of this term which frequently and implicitly is connected with value judgements. The term of the knowledge society is used similarly.

Frequently one speaks of “Information Society” as a state characterized as follows (descriptive approach):

• An increasing part of the gross national product stems from the information sector.
• Enterprises and private households use intensively digitally mediated information.
• Co-ordination processes in all social systems are more and more spatially and temporally decoupled.

With this approach one could accept the impact of ICT on the society as a fact and one could miss the basic question of the technique ethics: “With which technology we want to live in which world?” In contrast to this approach GIANI points out the possibility to shape the development. Information Society, quite similar to Sustainable Development, is understood as a guideline pointing to a goal which should be reached (normative approach):

*Information society is a society, in which each individual can satisfy its needs for information and communication, without hurting the democratic rights of others.*

In concretizing this guideline – as in the case of Sustainable Development — conflicting aims and controversies are to be expected. These can be solved in a social discourse only. In each case it requires an analysis whether the increasing availability of data also increases information or knowledge. In this context data have to be understood as a symbolic representation (e.g. numbers, character strings or pictures) of coded experiences or events. The socially mediated ability to “read” data is the “tool” to transform data into information. If finally the individual is able to apply the information to the context of his life, then he transforms information into knowledge. Similar can be said for organizations.
5. **A Sustainable Information Society Doesn’t Come About by Itself**

The today’s discussion on Information (or Knowledge) Society is motivated by a close connection of three developments:

- **Technical progress**: Innovations within ICTs are coming out within a short time.
- **Economic growth**: ICT industries are sectors of large economic growth.
- **Change of life-styles**: The use of modern ICT changes not only the working sphere, but also education, leisure, and shapes new life-styles.

Economic competition is seen as the driving force behind these developments. Fighting for market shares, searching better production sites, jobs and and higher wages one uses new resources, which leads to new technical solutions, products, jobs, and one re-defines incomes.

It is difficult to predict the result of this close connection of technical progress, economic and life-style changes. But the uncertainty of the prognosis should be understood as a chance for shaping the development: “The best way to forecast the future is to create it”.

The rapid development of ICT creates chances for the individuals and for the society that have only begun to be explored. Every day new opportunities are available to influence this development and to get us closer to the goal of Sustainable Development, i.e. to reach a type of economy that is compatible over the long run with human and social welfare, and with nature.

Yet, there are clear signs that these opportunities are being missed. The discussions about Information Society and Sustainable Development are still poorly connected. There are many negative effects of ICT on humans, society and nature which are being given too little attention at present. The positive effects would be more likely to come about if they were given the proper framework conditions.

The undersigned scientists of this memorandum are reaching out to politicians, corporations and the scientific community to seize the opportunity and to make the Sustainable Information Society a reality.

6. **Three Levels of Impacts and Opportunities of ICT**

(Effects of ICT)

In the memorandum three levels of the effects of ICT are considered:

- Effects created by the physical existence of ICT and the respective processes involved — for example energy and materials consumption during production, use and disposal of ICT. *(Effects of ICT supply)*
• Effects of the ongoing use and application of ICT — for example energy conservation by process optimization or avoidance of traffic by telecommunication. 
  (Effects of ICT usage)

• Effects on the entire system as aggregated effects of a large number of people using ICT over the long term — for example the so-called rebound effects as a reaction to growing efficiency, change of economy, of institutional structures, and of life-styles. (Systemic effects of ICT)

The three dimensions of compatibility are subdivided along the three levels of effects. This yields nine “drawers”, in each are put a set of theses and recommendations. In spite of this detailed subdivision the memorandum seems to be the first paper that gives an overall sight on the chances and risks of a Sustainable Information Society. The considered keywords are indicated in the following pages. In a closing chapter of the memorandum a roadmap shows, which measures should be taken in the short, middle and long term (Dompke et al. 2004, 37—39).

Figure

Humans, society, nature: three dimensions of compatibility.
Supply, usage, system: three levels of effects of ICT.
6.1 Effects of ICT Supply

Before ICT can be used it has to be made available. The ICT supply covers the production of devices and infrastructure which has effects on environment and society. Raw materials are extracted, copper and glass fiber lines are produced and connected to networks, satellites are launched to the orbit, computer chips are manufactured, and programs are written. The devices are supplied with energy, attended, repaired, modified and finally disposed as waste. With "Pervasive Computing" one intends a rigorous penetration of the everyday life with ICTs. Utensils, vehicles, buildings, clothes and also the human body would be equipped with components to transfer, process and store data. (Dompke et al. 2004, 16—22)

Keywords:
- **Humans**: Conditions of work, radiation, physical contact with ICT, user needs.
- **Society**: Economic importance, globalization, employment of capital, monopolization, complexity of systems, quality assurance, dependable computing, usability, technical migration and accessibility of data, information opportunities.
- **Nature**: Consumption of resources and energy, poisons (toxicity), space and building needs, life cycle of devices.

6.2 Effects of ICT Usage

Today, in developed countries, almost all sectors of our life are influenced by ICT. In much areas things wouldn’t work without it. Products, plants and technical processes are designed with the help of ICT. Based on ICT the public administration processes mass data of the citizens. Many medical diagnoses and therapies have become possible by ICT as well as new ways of learning. Computer-controlled devices for household and entertainment are today so natural that often one is not conscious that the functions are steered by ICT. (Dompke et al. 2004, 23—31)

Keywords
- **Humans**: New individual relations, new forms of co-operation, new knowledge and learning possibilities, complexity, informational self-determination, labor, honorary activities, family, health.
- **Society**: New social relations, economy, industrial relations, Digital Divide, cultural variety, lifelong learning, data security.
- **Nature**: Factor 10, dematerialization and its limits, life cycle of devices, supply of spare part, direct induction effects.
6.3 Systemic Effects of ICT

To be realistic one has to consider the aggregated effects of a large number of people using ICT over the long term. The demand for products and services will change, if by the employment of ICT products and services become cheaper or when they can be consumed faster. Also the organization of enterprises will be changed by such effects, likewise the structure of the national economy. Finally the life-styles of individuals will change since ICT enables to establish personal relations quickly and without local contacts. In particular the patterns of time use and mobility will change.

One has to take into account the unwanted and so-called rebound effects as a reaction to growing efficiency, change of economic and institutional structures and change of life-styles. One such effect is the economically explainable fact that efficiency improvements (in particular the technical possibility to realize the same advantage with less consumption of resources) do not lead to savings, but to an expansion of activities. This usually is the case if things or services become cheaper or if the consumption requires less time than before. An increasing demand can compensate or even overcompensate the expected savings. (Dompke et al. 2004, 32—36)

Keywords
- Humans: New life-styles, liberties and dependencies, scope of activities.
- Society: Social information space, data jungle, Agenda 21.
- Nature: Indirect induction effects, rebound effects, environmental dumping.

7. A Summary of the Memorandum

The authoresses and authors summarize the most important points as follows:

1. The authoresses and authors are concerned about the widely exhibited trend to interpret the exponential growth that we have had thus far in digitally stored and transmitted data as a growth of information or knowledge. The Internet may offer great opportunities to develop into a society that is more informed and more knowledgeable; but such a development should not be attributed to the existence of technical conditions alone.

2. Although ICT offers great opportunities for education, participation in markets and politics, the efficiency of markets, the creation of communities, open discourse and intercultural understanding, a trend is ascertainable today that these opportunities are being distributed very unevenly. ICT is threatening to exacerbate the divide between rich and poor, especially between the Global North and South, unless political will is brought to bear so that ICT applications are oriented more towards the local needs of people and to create more educational opportunity for young people worldwide.
3. ICT is creating spaces for individuals to choose their own lifestyles, to take self-responsible action and to enjoy more personal independence. At the same time, though, they are bringing with them new dependencies on infrastructure and companies who dominate the market. Furthermore the technology is becoming increasingly obtuse, and as a result people have to rely on blind trust if they want to use ICT efficiently, because they have less opportunity than ever to verify what is going on. Even for ICT experts it is becoming more and more difficult to establish a relationship between cause and effect in the digital world. Therefore research should concentrate on the social risks arising from this state of affairs, especially as regards the distribution of responsibility.

4. The substantial increases in efficiency that are being demonstrated in the ICT sector itself (as per Moore's Law) and through application of ICT to optimize processes, and to substitute information services for products or telecommunications for travel, do not automatically cause any resources to be saved. This is due to the so-called rebound effect, according to which a transition to more efficient technologies causes an expansion of activities given constant costs and time budgets. Because of this effect technological measures alone do not cause a reduction in the use of natural resources by production and consumption. Instead politicians have to create framework conditions to create incentives for a more economical use of material and energy.

5. Too little attention is being paid to the fact that both the energy consumption of ICT and the expansion of electronics waste are becoming new threads. Most of the electronics waste collected worldwide is being disposed of in poor countries with technology that is totally insufficient, and is causing great danger for humans and the environment.

There is no doubt that ICT offers a great potential for Sustainable Development that has hardly been tapped yet. However, unless the downsides and risks of ICT are assessed realistically and discussed openly, the opportunity to reorient our activities towards a Sustainable Information Society may be lost. (Dompke et al. 2004, 11)
References
