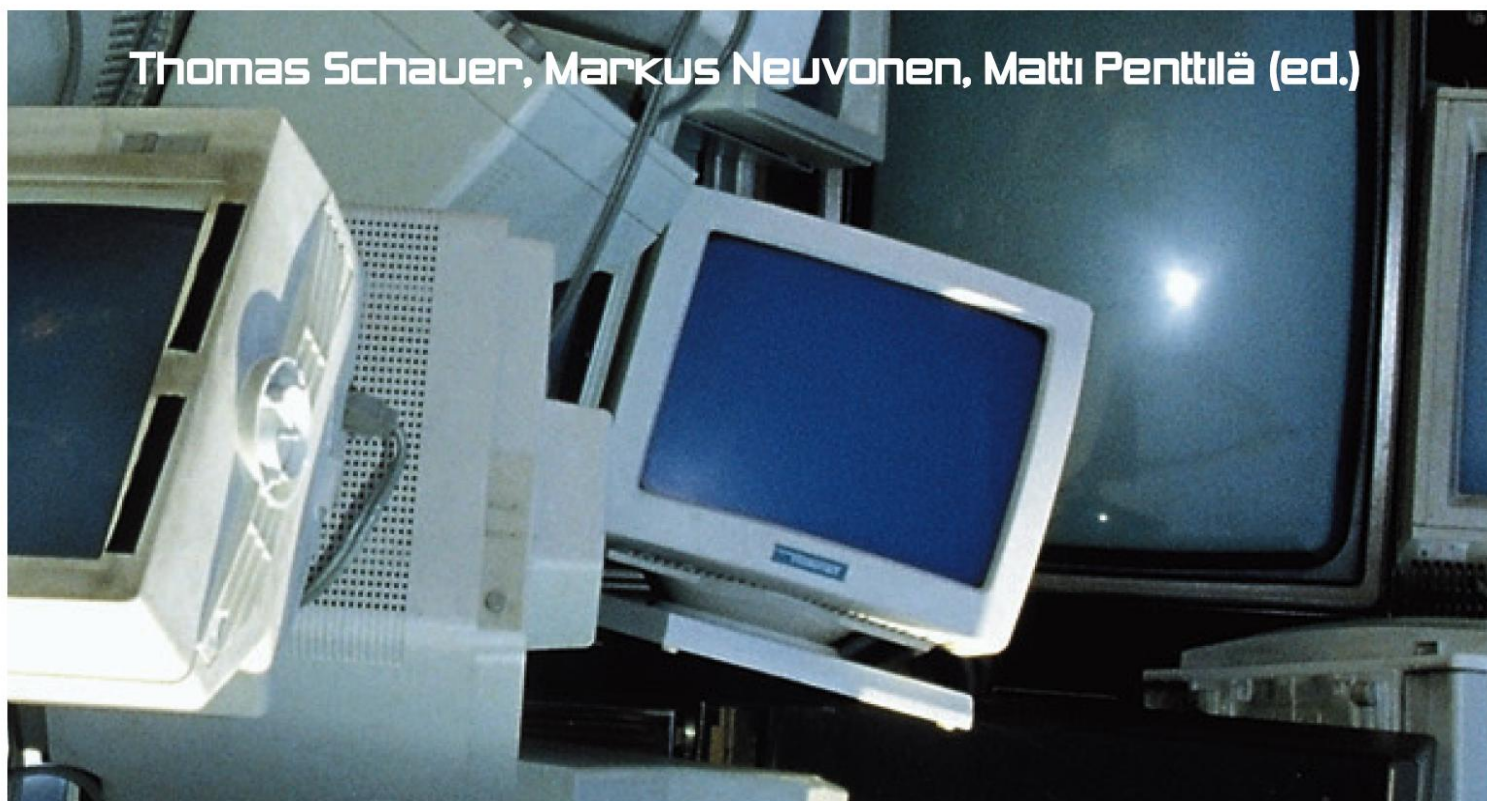# Information Technology
Competitiveness
and the Environment

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Hallituksen politiikkaohjelmat
Tietoyhteiskunta

Finnish Association, Brussels-EU Chapter
European Support Centre

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Opening

Markku Nurmi
Director General, Ministry of Environment, Finland

Dear Ladies and Gentlemen! It is a great honor to open this symposium of the Club of Rome. Actually I have been following the activities of the Club for a long time, starting as a young post graduate student, when I picked up my exam books of computer science which was my by-subject in my doctoral thesis at the University of Technology, I chose one book "World Dynamics" by J. S. Forrester which was actually the basic book on which "Limits to Growth" was built. Finally my doctoral thesis was a kind of a blueprint for sustainable development, which was actually quite difficult to be accepted, as even the word "Sustainable Development" had not been invented yet at that time.

Related to the topic of Information Technology and the Environment, I would like to make some comments based on my experiences with the European Environmental Agency EEA, in which I am in the Management board since the start of the EEA in 1994. The European Environment Agency has its head office in Copenhagen. It is the main body for the provision of environmental information for the European Union. It is not easy to have all the required information systematically worked out. There are over 20 different languages to deal with, and lots of information has to collected and processed on many different sectors.

Information technology plays an important role in providing the environmental information, for example related to European spatial data. The tasks are challenging: how to build for example spatial information into the same map on different levels. The new system which looks very promising is satellite-based, the GMES - Global Monitoring of Environmental Security. Particularly the space agencies have contributed to the solution of many problems in detail. In the satellites there is a lot of lots of extra capacity and how to use those, is a key issue for them. Collecting environmental data is one of their potential markets.

There are already promising applications in the environmental field. Weather observations, tracking large forest fires, oil spills or flooding, or ice coverage lifting.

Of course the inclusion of satellite based technologies means a change because the tradition of observing the environment has been on the grassroots level, requiring a lot of labor. If we switch a system, we need to switch other systems too, including labor on the field.

Presently there are trials to combine the information from the member states in European Union and different organizations: EEA, Eurostat, Joint Research Center, how to report to international conventions etc. One of the main problems is actually the EU itself, wanting to have different kind of information for many directives. Quite often even though we try to systemize information management, certain directives require modifications in data acquisition and processing. And finally squeezing all that information into a format which is easy to read and understand by the users is a main challenge in the work on environmental information.

Thank you very much for your attention, I am looking forward to an afternoon with interesting presentations on information technology, competitiveness and the environment.

Call for a Global Roadmap for Environmentally Oriented ICT

Sirkka Heinonen
Associate Member of the Club of Rome

Environmental issues have been on the agenda of the Club of Rome from its very beginning. Environmental concern became more widely pronounced with the publication of the Limits to Growth report in 1972, which was recently published as a 30 years update. The message was clear: it's still not too late to turn to follow the sustainability path, though it would have been much easier and wiser to do so already several decades ago. Human beings and the natural world are on a collision course as the World Scientists' Warning to Humanity stated in 1992. Climate change and the resulting global warming is accelerating due to increasing GHG emissions, largely produced by industry, homes/buildings, and transport.

Good news is that today global consensus has finally been more or less reached about the existence of the phenomenon of climate change and recognition of the role humans play in causing it. Bad news is, however, that different political leaders, and even scientists, disagree about
• the pace and the scale of negative impacts from global warming;
• what schedules and timeframes should be set for action; and
• which measures and steps are the most effective.

Europe has every possibility to become a competitive and innovative harbinger of environmentally-friendly ICT. A major challenge is to integrate the two usually independent lines of technological development and policy-making - ICT and environment. In theory, there is great potential in harnessing ICT to environmentally positive applications. In practice, however, this alliance is not at all automatically self-evident. (Heinonen et al. 2005).

It is essential to ear in mind that the role of ICT in relation to Environment is twofold:

1) ICT in itself should be greener, the amount of chemicals in production phase and the amount of electronic waste could be reduced. The EU Directive on electrical and electronic waste is a sign of progress. The ways to use ICT may also be

upgraded in environmental sense. We can, for example, bear in mind that standby in electronic equipment also uses considerable amounts of energy when the number of equipment is high. The ecological footprint of ICT can be decreased if closer attention is being paid to it. The ecological transparency of the information society would help in this. (Heinonen at al. 2001).

2) ICT should be applied to help reduce negative environmental impacts of different products, services, processes, business models. ICT is here an environmentally profiled tool and instrument.

Technology is a necessary but not sufficient prerequisite, e.g. for reducing GHG emissions. Besides technology we need goals for action and a will to start acting for those goals. We need to harness technology - here in this symposium we'll concentrate on ICT technology - to pursuing these goals. Above all, we need a mental shift - through raising environmental awareness we'll pave the way for making goals into a roadmap - concrete steps to take. Perhaps this Symposium will be a Countdown for making a Global Environmentally Oriented ICT Roadmap. Technological developments have to be seen in a social and global context. Consumption patterns should be changed and environmental-friendly lifestyles should be encouraged, but this may mean quite different approach in different parts of the world. Hand in hand with economic growth, technology should enable greener applications, more energy-efficient solutions and renewable energy use policies. The mental shift could also gradually move from energy-efficiency towards energy-sufficiency.

The black-and-white approach to technology is futile.
• Not: Technology will solve all problems.
• Nor: Technology does nothing but cause problems.
• But: We need to encourage technologies that will reduce the ecological foot print, increase efficiency, enhance resources, improve signals, and end material deprivation.
• And: We must approach our problems as human beings and bring more to bear on them than just technology. (Meadows et al. 2004, 278).

In other words, social, cultural and policy context should always be reflected upon technological issues. The role of technology for humans has been inter-

twined with the role of nature and environment for humans throughout the history in various forms. (Heinonen 1999).

In developing technology to slow down the climate change through diminishing GHG emissions, it's important to develop a wide variety of different technologies to choose from (e.g. renewable energy, wind, solar, biomass, carbon capture and storage etc.). This is essential, since each country or continent may need different technologies to implement. How ICT can be used in various combinations to other technologies is also an interesting challenge.

The EU could harness its "intellectual energy" and even "ethical energy" to develop and introduce environmentally oriented ICT for its own region and for other regions to benefit globally. The EU could make combating the negative effects of climate change into a key driver of the economy. The EU could take the lead in developing ICT applications and market them worldwide (making business out of them). By reducing GHG emissions the wellbeing and quality if life of people will be improved. Competitiveness could thus bolster wellbeing.

To conclude, it has been said that in the years to come the issue of climate change and global warming will dwarf all the others combined. It will become the only issue (Flannery 2006). Now it's time to act seeking for environmentally oriented ICT innovations, preferably combining technical and social innovations for a Post-Carbon World. The experience from the state of California shows that reducing carbon emissions is profitable for companies doing business in California. Hundreds of companies have reduced energy consumption, making the state more energy-independent, saving money in the process. We know the science, and we see the threat. The time for action is now. (New Scientist 2006). Now we have the opportunity to learn from the best practices of European stakeholders and corporations in introducing environmentally friendly ICT.

I wish you all an interesting Symposium and hope this will encourage us to make a few concrete steps further both at organisational and personal everyday level. Let's Act Before It's Too Late (Peccei et al.)!

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The IT Revolution, Rebound Effects and Environmental Burden

Thomas Schauer
Director, European Support Centre of the Club of Rome

Resource Consumption in the Information Society

Wealth and resource consumption is very unequally distributed on our planet. At the turn of the century, 20% of the world population consumed 80% of the resources. And while the industrialized countries have today a high level of protection of their local environment (air and water quality have improved) they hardly manage environmental problems which result indirectly from their population's lifestyles - like climate change. Many countries like China, India and Brazil are catching up, they increase their share of resource consumption and they start to contribute more and more to the global environmental problems.

In this situation we are entering the information age and the impact of the new technologies on the environment might be decisive for our future. But how will this impact on our lifestyles and our resource consumption look like?

Thanks to new information technologies, real products and services can be replaced by virtual ones. The virtual economy will be primarily a service economy which makes it possible to decouple economic growth from resource consumption. In this context, concepts of de- and even immaterialisation of consumption are discussed. A future in which the substitution is realised can be described by a cyberworld scenario. The life of humans is transferred more and more to virtual worlds and resource consumption in real life decreases. Data highways replace physical highways, virtual meetings replace physical meetings and most conferences will be done as videoconferences. These assumptions are supported by research which shows that people in all industrial countries tend towards post-materialistic attitudes and values. Clearly, information technologies offer the tools for the realisation of such a scenario, no other technology before provided a similar potential of dematerialisation.

On the other hand, there is reason for scepticism. The industrial society had for example replaced the agricultural society mainly with respect to the workforce. People moved from agricultural work to work in industry. On the material level, the industrial society did however add to the agricultural society. Via a positive feedback, even more agricultural products could be produced in the industrial society than in the agricultural one. In 1840 Justus von Liebig had published his findings about the application of chemistry in agriculture which resulted in the broad use of fertiliser and an increase of the cereals production. In parallel, even though IT workforce substitutes industrial workforce, the information society may produce even more industrial goods than the industrial society - again due to a positive feedback. Such a pattern of development would lead to an ecological disaster.

One of the mechanisms that prevent information technology from realising their potential for the reduction of the global resource consumption is the Rebound Effect. Increases in resource efficiency result in lower prices for products and therefore consumption increases to such a high level that the relative resource savings are compensated by the general growth. For example, some centuries ago only very privileged people could afford an orchestra. The resource consumption of the individual orchestra was high, but there were not many of them. Today information technology makes it possible to enjoy music with devices like CD or MP3 players which consume much less resources than an orchestra. But they have become so cheap that millions of people can use them and the overall resource consumption has increased (obviously it is not easy to bring the social and the environmental dimension of sustainability together).

Some areas, in which the increasing resource use is directly visible are:

- Energy consumption: A contemporary PC with a monitor has an energy consumption during use which is comparable to the metabolic turnover of a human being;
- Paper consumption: The paperless office is realized only slowly and for the time being restrictions to printing in the offices or at home are mainly due to cost of toner and ink cartridges and paper.
- There is a "mountain" of electronic waste that grows every year and contains still quite a variety of hazardous chemicals.

There are even more areas, where a reduction of resource consumption did not occur: travel did not decrease. People are today as mobile as they have never been before, and there seems to be a close relationship between communication and travel behaviour. There was already in the pre-Internet age a correlation between the number of messages sent by people, beginning with letters and later including phone calls, and the number of kilometres travelled. The increase of the two entities was in parallel. Did people in the past forecast that because of telephone calls, which bridge distances easily, they would travel less, and that television would replace holiday trips because they could see foreign countries comfortably from their home? E-mail and video conferences, was the argumentation since the late 90s, would result in a replacement of motorways for cars by information highways. But not much of this trend has been observed so far. Of course we use the new technologies, but we increase our overall communication activity, while at the same time travel statistics show that traffic continues to grow.

The Political Agenda: The Lisbon Strategy

Whether or not the huge dematerialisation potential of the new information technologies will be realized depends on the political frameworks. Unfortunately, these frameworks have not been set adequately during the IT-boom. The Lisbon Strategy was agreed upon by the Lisbon European Council in March 2000 and was designed as a new political strategy for the European Union "in order to strengthen employment, economic reform and social cohesion as part of a knowledge-based economy".

The Council stated that a "radical transformation of the European economy" was required as a consequence of globalisation and the challenges of a new knowledge-driven economy. The strategic goal for the European Union according to the 2000 Lisbon Strategy can be characterised by the most frequently cited phrase from the document. The Union wanted "to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion". Aspects of the strategy were an information society for all, establishing a European area of research and innovation and creating a friendly environment for starting up and developing innovative businesses, esp. SMEs. "Sustainable" did not mean in this context that economic growth should not occur if it resulted in higher burden for

the environment, it meant just permanent and high economic growth. Political measures for environmental sustainability were missing in the 2002 Lisbon Strategy. The focus was just on growth itself (3% were indicated as a realistic prospect). An explanation may be derived from the Council's understanding of the corresponding causal relationships at that time: "The shift to a digital, knowledge-based economy, prompted by new goods and services, will be a powerful engine for growth, competitiveness and jobs. In addition, it will be capable of improving citizens' quality of life and the environment." The knowledge-based economy was not only regarded as the tool that provided economic growth, it was also supposed to lead to a better environment.

It is helpful, to have a look at some documents which had been prepared before the Lisbon Strategy was decided upon, because they reveal the spirit and way of thinking at that time. For example, the DG Information Society of the European Commission published 1998 a status report "Towards a Sustainable Information Society", in which there was a very positive prognosis: "No other technology than IST offers such a high potential of "Dematerialisation", that is, the same value added with much less resource input and environmental burdens, ... It is clear that with the Information Society, new opportunities are emerging which will help to achieve both global environmental sustainability and continued economic growth; to achieve social goals of employment growth and local community development within a free market framework; and to enable greater access to work, services and mobility without congestion. This new opportunity for a triple win-win development is in stark contrast to the current debate on sustainability, notably in Rio and Kyoto, where the goals of sustainability are seen to be in conflict with economic growth, employment and industrial interests."

Revised Strategy and the Long Way to Environmental Sustainability

The 2000 Lisbon Strategy was no success story. It became soon obvious that the European Union did not reach the economic growth it aimed at and in the area of sustainable development negative trends continued. The Lisbon Strategy has been revised in 2005. Ecological aspects have been taken into account. An essential step towards sustainability in the renewed Lisbon Strategy was the inclusion of environmental technology as a potential engine for growth and jobs: "The European Council reiterates the important contribution of environment policy to growth

and employment, and also to the quality of life, in particular through the development of eco-innovation and eco-technology as well as the sustainable management of natural resources, which lead to the creation of new outlets and new jobs. It emphasises the importance of energy efficiency as a factor in competitiveness and sustainable development"

It was a long way from the original Lisbon Strategy 2000 to the inclusion of ecological items in 2005. And it will be still a long way until the ecological problems related to information technology will be solved. The EU directive on electronic waste (WEEE) has been a milestone. There are initiatives for the reduction of energy consumption by electronic equipment. Consumers are now more aware of the problems and industry is improving their products. The direct environmental consequences of information technology are more and more under control. However, the indirect ones need further efforts. How to deal with the steadily inreasing mobility and the resulting environmental burden? How to deal with the structural changes induced by e-commerce? More and more small vans are on the way, delivering products that have been purchased online.

And we have lost time because we did not manage to take the problems generated by a new technology into account early enough, being influenced by the idea that a technology that has such a tremendous potential of dematerialisation would automatically solve our problems of resource consumption. Could we have known better? Perhaps yes, but the belief in the potential of technology to solve our problems is always seducing. If technology does the job, consumers do not have to change their behaviour, the economy needs not to change production and politicians can avoid unpopular decisions.

Backgound Information

Thomas Schauer - The Sustainable Information Society, Vision and Risks
ISBN 3-89559-042-8

Thomas Schauer, Franz Josef Radermacher - Equality and Diversity in the Information Age
ISBN 3-89559-050-9

ICT for Environmental Sustainability and Growth

Rosalie Zobel

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1. The i2010 Initiative

We are following a strategy for the Information Society in Europe called i2010 which is a key component of the EU's renewed Lisbon competitiveness strategy. The i2010 initiative has three priorities:

1. A Single European Information Space, which promotes an open and competitive internal market for information society and media.
2. Innovation and Investment in Research aims to strengthen innovation and increase investment in ICT research to promote growth in Europe as well as more and better jobs.
3. Inclusion, better public services and quality of life is about achieving an Inclusive European Information Society that promotes growth and jobs in a manner that is consistent with sustainable development and that prioritises better public services and quality of life.

2. The Renewed Lisbon Strategy

There is a strong complementarity between the EU's Sustainable Development Strategy (SDS) and the Lisbon Agenda. The EU Council stated in June 2006: „The EU SDS and the Lisbon Strategy for growth and jobs complement each other. The SDS is primarily concerned with quality of life[…while the] Lisbon Strategy makes an essential contribution to the overarching objective of sustainable development […] increasing competitiveness and economic growth and enhancing job creation." The ICT sector is key to enable growth and productivity in all economic areas, to reduce the environmental footprint of human activities and to improve quality of life.

3. ICT for Environmental Sustainability and Growth

Climate change is an unprecedented situation in the history of Earth. We are driving towards a wall and all must contribute to restore a healthy planet - including ICT. Our aim is to eventually launch an initiative on "ICT for Environmental Sustainability and Growth". The driving objective is to enhance the ICT contribution to sustainable growth and environmental sustainability, namely by

- decoupling economic growth and environmental degradation,
- moving towards a cleaner, safer and healthier environment
- reducing environmental risk on society
- improving efficiency in the use of raw materials / natural resources
- and improving energy efficiency

4. R&D Work in FP7

In the 7th Framework programme we will focus very much on "ICT for environmental management and for energy efficency" – identified as major challenges for the future. The focus will be on environment monitoring and management, the application of ICT to energy-intensive products, processes and services, and on coordination and support actions. The initiative "ICT for environmental sustainability and growth", falls within the framework of the third pillar of i2010 and aims to highlight the positive contribution that ICT can make to sustainable growth and to creating awareness and accelerating the adoption and deployment of ICT-based solutions. It will focus on more efficient production and use of energy and natural resources; on support to the monitoring and management of our fragile environment; and on a better prediction and mitigation of and response to man-made and natural disasters. The initiative aims to a commit industry (large and small) and national/regional authorities to environmental sustainability as a means for future competitiveness and job creation.

5. Energy Efficiency

We have been discussing with major stakeholders what we need in detail related to the energy efficiency area. The main areas should cover:

- homes and buildings, e.g. demonstrate intelligent management and control systems for energy savings aiming at energy neutral buildings
- the ICT industry itself, e.g. encouraging adoption of innovative energy saving electronic devices (e.g. standby, lighting), ICT systems and appliances, including energy scavenging technologies. A lot of energy is wasted through leaving things on all the time, in standby mode, for example. We should also encourage people to use new forms of lighting which are now being developed and coming into the market. For example LED-based lighting reduces the energy consumption by 90 %. Energy scavenging technology helps extract energy, for example from the heat of our body, or our movements when we walk.
- CAD methods and tools assessing and optimising the energy profile of energy-intensive products and processes covering their full life cycle.
- innovative ICT-based systems for the monitoring and control of the production, distribution, trading and use of energy (e.g. keywords: "multisource" and "cogeneration"). Pilots for local networks of power grids and intelligent electronic metering are envisioned.

First areas of choice for ICT for energy efficiency will be

- those with a large share of energy consumption (e.g. buildings/homes) and significant energy saving potential;
- those where ICT would have a significant leveraging effect;
- those where industry and/or public institutions have already demonstrated serious commitment;
- those which would have an effective impact on energy user behaviour; and
- Overall support to reducing by 20% energy consumption by 2020 (following the Energy Efficiency Action Plan proposed by the Commission).

6. Environmental Monitoring

Environment monitoring is limited by the fragmented capacity to access or even manage a wide range of information and services, the heterogeneity in system architectures, technical implementation, data structures and semantics and the incompatibility amongst accessibility rules to data and services applied by organisations. The challenge is to foster the emergence of an Integrated European Information Space for effective environmental monitoring, namely to promote

and demonstrate seamless collaboration among environmental institutions and service providers, to promote the IEIS approach to relevant European and international initiatives such as INSPIRE, GMES, GEOSS and to support rapid and broad deployment of environmental services based on a system of systems approach.

7. Prediction of and Response to Disasters and Crisis Situations

Anticipation of crisis situations is limited by the lack of an IEIS and varying regulatory constraints and the heterogeneity of potential disaster types (e.g. nature, criticality, magnitude, geography). Response to crisis situations is limited by the weakness of the preparedness, the emergency response interoperability amongst involved organisations and time-criticality and accuracy of early warning information. The challenge will be to foster a pan-European infrastructure aiming at reducing the societal impact of natural and man-made disasters. It will reinforce synergies with the IEIS actions and the eCall (eSafety initiative), launch a Public Safety Communication Forum, promote disaster resilience measures (e.g. for critical infrastructures) and contribute to an EU-wide emergency telecoms spectrum policy.

8. Objectives of the Initiative and its Implementation

The overall objective of the "ICT for Environmental Sustainability and Growth" initiative is to provide an overall strategic framework for community action. This includes

- to devise and implement adequate European policies
  Examples: elf-regulation in agreement with industry and relevant stakeholders; standards/recommendations for harmonised approaches; MoU; operational guidelines etc....
- To support RTD on next generation of ICTs contributing to environmental sustainability
  Examples: more energy efficient and environmentally friendly ICT devices and buildings; low-cost solutions for environmental monitoring; ICT-enabled energy efficiency solutions in relevant industrial sectors, including distribution, trading and use of energy.
- To raise awareness about ICT-based solutions for environmental sustainability

Examples: set up ICT-based pilots demonstrating and assessing effective environmental monitoring, energy savings (e.g. buildings) and preparedness / early warning procedures; exchange and transfer of best practices; encouraging pre-commercial procurement of innovation.

Implementation of the initiative will include the launch of a stakeholder forum with high level participants from industry (including SMEs), Member States, and academia. The Forum will provide recommendations, roadmaps, long-term visions through Working Groups established where and when relevant. The Forum will be supported by DG Information Society and Media who will coordinate with relevant services of the EC and with relevant ongoing initiatives.

9. Next Steps

We expect to have a Communication on the initiative by mid 2007, followed by the official launch of the Forum in the Fall of 2007. Networking activities would be launched in early 2008.

Further information

Initiative i2010:
http://europa.eu/information_society/eeurope/i2010/index_en.htm

7th Framework Programme:
http://cordis.europa.eu/ist
http://cordis.europa.eu/

ICT for Environment:
http://cordis.europa.eu/ist/environment

IT with a Sense of Responsibility:
From Eco-Design to Remarketing & Recycling

Hans-Georg Riegler-Rittner
Vice President Total Quality Management, Fujitsu Siemens Computers

1. Fujitsu Siemens Computers at a Glance

Fujitsu Siemens Computers is the leading European IT provider with a strategic focus on next-generation Mobility and Dynamic Data Center products, services and solutions. With a platform and services portfolio of exceptional depth, our offering extends from handhelds through desktops to enterprise-class IT infrastructure solutions and services offerings. Fujitsu Siemens Computers has a presence in all key markets across Europe, the Middle East and Africa, with the services division extending coverage up to 170 countries worldwide. Leveraging the strengths, innovation and global reach of our joint shareholders, Fujitsu Limited and Siemens AG, we make sure we meet the needs of customers: large corporations, small and medium enterprises and private users. To meet international standards for corporate social responsibility, Fujitsu Siemens Computers is a member of the United Nations Global Compact. For more information on Fujitsu Siemens Computers, please visit: www.fujitsu-siemens.com.

2. Fujitsu Siemens Computers' Environmental Management System

Fujitsu Siemens Computers invents and builds its products in Augsburg and Sömmerda, Germany. Delivering PCs and servers from these German manufacturing facilities, which are Europe's most modern ones, allow us to response to customers' requirement in a very fast and flexible way in our EMEA market.

2.1 The Management System

The company's Management System is certified according to ISO 9001 (Quality) and ISO 14001 (Environment) since many years. And the Certificate includes the factories and all other sites in EMEA.

Besides the ISO-driven requirements and aspects our Management System and our processes are based on these four fundamental Management Principles:

- Outstanding quality is essential for our customers and for our success
- We use our creativity and innovative technology skills to preserve our environment
- We take responsibility for the safety and health of our employees at work
- We stick to our company values and ethics principles

So, our Environmental Management System is a fully integrated approach to environmental protection and is including all employees and suppliers by motivation and by contracts, respectively. This system is representing a closed learning loop, starting from product development towards production, product use, remarketing & recycling, and back again to next product designs. And it is in place since the year 1988 when the company started with taking back and recycling old IT equipment.

An impressive list of milestones demonstrates our long tradition in environmental pioneering and social commitment, from the first 'Guideline for environmental conscious design' (1992), first 'Green PC' with the Energy Star in the market (1993), first IT manufacturer to receive the Blue Angel eco label (1994), …, to first 'green' mainboard (2002) which was significantly ahead of legal requirements (RoHS).

2.2 Development and Production

Expensive and not state-of-the-art – these are the two most common judgments passed on environmentally friendly products. Fujitsu Siemens Computers not only refutes both of these arguments with its Green PC, but also views the company's own environmental initiative as an important motor for the innovative drive of the enterprise.

In product development, purchasing and production we stick to our Statement of Precautionary Principle: We are committed to eliminating the use of harmful and potentially harmful substances in our products and production processes in order to minimize any risk to end users and to the environment. Therefore, minimizing

hazardous substances wherever possible – and going beyond legal requirements – is an important target of our Environmental Policy and our Global Sourcing Strategy. Thus, our suppliers have to sign our above mentioned 'Guideline', and we recently joined the 'Design for the Environment' Program at U.S. EPA.

Our continuous efforts in reducing both energy use and waste volume during production at the Augsburg plant shows a steadily declining amount of power consumption in kWh / PC (by 60 %) and waste volume in kg / PC (by 70 %) during last 12 years.

2.3 Product Use

However, the (by far) highest amount of energy consumption in the product life-cycle of a PC occurs during its use – depending on customer's needs and behavior, of course. Therefore, it is very important to inform (and probably educate) customers how to optimize use of energy-consuming products like computers and others. Coming down from some easy calculations (reference: www.eu-EnergyStar.org) and comparisons, it's quite obvious that a 'best practice' PC from Fujitsu Siemens Computers may consume 60 kWh per year only, while a 'typical' configuration may use 160 kWh / a (or even more). So, it may be helpful to show these differences to customers in an easy-to-understand manner. A simple (!) sticker or information put on the product might be useful and should strongly be considered by the industry and all standardizing bodies involved – and being introduced, soon.

By the way, comparing the CO_2 emissions, it might be interesting to see that the energy consumption of a 'best practice' PC (60 kWh/a) which is equivalent to a CO_2 emission of 37 kg/a will be in the comparable range of driving a car (typical CO_2 emission: 186 g/km) over a distance of 200 km. – So, telephone conferences and net-meetings with the help of PCs will significantly contribute to our savings potentials regarding greenhouse gases.

2.4 Remarketing and Recycling

The Remarketing & Recycling Center, which has been operating in Paderborn, Germany, since 1988, and handles on average of about 4.000 tons electronic waste

per year, treats returned products following a 3-stage concept: First, the entire system is inspected in order to possibly sell it again as a used system and thus to extend the life cycle. If this is not feasible, components or assemblies are refurbished and reused for repairs, but not for the production of new equipment. Reusable used systems are marketed by Fujitsu Siemens Computers over its distribution network and on its own online shop under the heading of "Refurbished and Recycled". Finally, the equipment is disassembled and separated into up to 50 different material groups. Qualified partners handle the material recycling. The recycling processes are taken into account in the development of new products.

The share of materials that cannot be recycled or burned has been reduced to about two percent. By setting up its own recycling center and picking the right recycling partners, Fujitsu Siemens Computer helps to prevent electronic waste from being exported illegally into developing countries.

3. Outlook on 'new' challenges

The new eco-design requirements coming soon (target: mid 2007) and the European-wide legislation for Energy-using Products (EuP) will certainly challenge both product manufacturers and users. It will be necessary to understand that environmentally-friendly products and production are not 'for free'. However, our experience shows that ecology and economy can be balanced if a corporate sense of responsibility is the driving force.

Working together with representatives from the different industries, research institutes, governmental and non-governmental organizations, etc. – and based on our long experience as a market leader for Green PC products – we used to demonstrate our company's responsibility in the information age.

Save the planet by Green IT !

Dimensions of ICT as Social and Economic Enabler

Ilkka Lakaniemi
Nokia Networks, Finnish Business and Policy Forum (EVA)

Growth in mobile communication has been fast. No other technology, whether it's the pace of television adoption, or the VCR has experienced such a fast growth compared to the penetration of mobile phones globally. By the end of 2007 - there will be more than 3 billion people using a mobile phone all over the world – (there will be 3 billion mobile subscriptions by the end of 2007). 3 billion - that's quite a landmark for any technology.

In 2001, I joined Nokia in its new Insight and Foresight unit, primarily looking into the future of global developments and how they would impact our business environment. At Nokia, we wanted to look beyond the current business focus of 5 to 7 years. In my work, I focused on the socio-economic issues. Recently I have been involved e.g. in an economic study on the beneficial impact of mobile phones in Africa, where increased social mobility was one of the main issues. Looking at the mobile phone as a device that enables people to access information, to share that information, or to simply give them the opportunity to make their first telephone call. The same device is also enabling them to become entrepreneurs: to advertise for their own services, to actually increase their wealth and thus to increase their actual well-being.

On the environmental effects, there is a divergence of opinions, whether information and communication technologies (ICT) have had an impact or not. In our understanding these technologies have had an impact, backed for example by the findings of the African study. It shows that when people actually have access to their first communication device, they are able to spare time and resources from unnecessary travel from one village to another.

I want to emphasize the deep social and economic impacts of ICT and mobile communications technology, for example the community involvement aspect of ICT. The OECD just recently ran a study trying to understand the impact on economic growth by community involvement enabled by ICT. A hot topic in the

era of "prosumerism", personal virtual content and booming Internet-based communities. It has been a difficult analysis process as economic growth is usually understood resulting in hard figures. In respect to the impact of community involvement on economic development, it is difficult to come out with hard figures, and making direct comparison between countries a challenging task. At Nokia we are currently involved in research to understand the above kind of soft issues, and how these issues could be studied and what are their evident and potential benefits - for it is important for us to understand, what the future market will be.

For communication as we know it today is changing. People are increasingly using electronic communications to access information, to share information (much more actually sharing today than simply accessing basic information) or to modify that information for their personal communications, also for their personal economic gain. For example, we should be aware of what people are doing with blogs – as these "virtual diaries" are gaining rapidly more momentum among all kind of users, whether young or old.

As the role of electronic media is becoming ever larger people, its forms are also changing; the traditional electronic mediums such as the TV and radio are increasingly making way for the Internet. Many people are spending more time in virtual environments than consuming the traditional media. This is a reality, not only for the technology savvy kids and for the traveling business executives, but it also including people from all age groups, income groups, all parts and segments of the society, both in developed and developing societies. Of course, the ways people are using this revolution in communications vary, but in general sense, the changing of global communication patterns is already changing the world as we know it much to the way earlier historical revolutions in politics or technology – the French Revolution and the Industrial Revolution.

In 2005, I participated in a discussion with Nicolas Negroponte about his idea for a $100 laptop; the very same device is now becoming a market reality. We discussed how useful it would be for different educational purposes and I agreed: it will be a great device for certain environments and types of situations. But a much higher number of people are already using mobile devices to access information and to communicate, even accessing the Internet for the first time. A comparison

between the usage of computers and the mobile phone finds that mobiles will be readily used for more varied applications than just voice and voice-based services. This is part of digital convergence, whether it's devices of whether it's services, or whether it's the infrastructure in itself. We could use the $100 laptops and mobile phones to develop the new skills, whether it's e-learning or m-learning by innovative learning programs and applications enabling people with very low level of ICT skills to learn new skills and to utilize them for a better life.

There is a convergence of different industries, different technologies, different ways of accessing information and sharing that information. It depends on how we actually manage to produce a device, to produce a service and new ways to communicate which are truly seamless and interoperable throughout these different technologies. We are making these technologies simpler and easier for people to use. When discussing wider social inclusion of technologies within the European community, we're still some way from a situation in which all European citizens are able to use a single type of device, a converged terminal, a converged device to access all information and kinds of services.

That is where the industry is going. There will be a number of various devices; I am not saying that we are getting rid of televisions, and other devices. But those devices are increasingly going to work in the near future in a more and more coherent fashion. An analyst once said that the industry was talking about digital convergence in 2000, and already in the early 1990's, and I have found articles about digital convergence ranging back to the 1970's and 1960's. However, what is making the difference this time is not only the fact that the technologies are becoming more and more mature, it's also the fact that the businesses, the industries understand how to make everything work in a converging fashion. But most of all, it's the fact that the people using these devices, whether young or old, are more familiar with the services and technologies.

Telecommunications – Still Unexploited Opportunities for Combating Climate Change

Kari Vaihia

Director Corporate Social Responsibility, TeliaSonera

Climate change concerns everyone, both companies and individuals, but different sectors/ industries have different possibilities to tackle the major challenge of helping the economy to grow while reducing environmental impact. In this context, the telecom industry sees its duty and opportunities in aiming for sustainable growth in general and combating climate change in particular.

However, in order to be credible, the company must ensure that it is seen to be working actively with climate change issues. In order to be efficient and effective, a company therefore has to work on at least 3 levels: own operations, co-operation and communication.

Own Operations

TeliaSonera carefully considers the energy and other CO_2-related issues in all its operations. We try to take care of our own backyard and, more importantly, - we try to take initiatives, develop indicators and find new solutions. For example,

- 9.6 % of Finnish operations used windpower in 2005
- Pilots of fuel cells are being conducted in Sweden
- An Energy Efficiency Index has been developed in Sweden
- LCAs (life cycle assessment) have been conducted for all telecom services
- R&D has facilitated the development of ICT for sustainable development

Co-operation

TeliaSonera has worked closely with ETNO, the voice of Europe's telecoms and electronic communications operators in Brussels. ETNO launched its Environmental Charter already in 1996 and in 2004 upgraded that to the Sustainability Charter. Around 20 major operators have signed the charter, which represents

about 90 % of the market in terms of turnover. Of particular note regarding the environment and climate change are a set of energy and climate change policies drawn up in 2006 and the annual ETNO sustainability report.

In 2001, a number of major ICT companies, with the support of UNEP (United Nations Environment Programme) and ITU (International Telecommunications Union), launched a global initiative for sustainable development, GeSI. TeliaSonera is a member of this through ETNO. The GeSI Forum was part of the Kyoto Plus Conference in Berlin and will investigate the increasing role information and communications technologies (ICT) can play in reducing greenhouse gas emissions, including

- The potential and limits of ICT to reduce GHG emissions.
- Different strategies and means to realize the potentials of emerging telecommunication services compared with current solutions.
- The role and responsibility of key stakeholders in the development of tools required for maximising the contribution of ICT to climate change mitigation and adaptation.

The ETNO – WWF initiative, 2006

The amount of CO_2 emissions for the EU-15 in1990 was 4266 million tonnes. Germany's emissions in 1995 were 1230 million tonnes and Finland's were 71 million tonnes. Emissions of climate-changing greenhouse gases (GHG) between 2003 and 2004 from the EU-15 increased by 11.5 million tonnes (0.3 %). Emissions of CO_2, the most problematic GHG, were 4.4% above 1990 levels for the EU-15. Road transport was the biggest contributor to this trend.

The project "Saving the climate @ the speed of light" is a joint ETNO-WWF initiative. The fruit of this project is a report entitled "Saving the climate @ the speed of light – first roadmap for reduced CO_2 emissions in the EU and beyond".

The objective of the report was to transfer small demonstration projects of how ICT services can reduce CO_2 emissions to best practices on a European scale. The main milestones of the roadmap are the following:

The first phase: an annual reduction of CO_2 emissions by 50 million tonne by 2010

- Virtual meetings: 24 million
- E-dematerialisation: 4 million
- Flexi-work: 22 million
- Additional tasks for policy revision, e.g on energy, taxation, transportation, innovation, procurement, incentives

The second phase: a 15-30 % reduction by 2020

- More services
- System solutions (combined services)
- Focus on sustainable consumption, production, city planning and community development

Today, many actors offer different options to reduce climate change. However, there should be a focus on solutions which allow a real change in travel practices for example, rather than options such as forest plantation, which are useful but may not represent a long term solution. Indicators should be used to chart progress, e.g. that videoconferencing will replace 20 % of internal EU business travel by 2010.

An important trend that could enable a shift towards virtual meetings, for example, is the increasing number of companies with meeting departments instead of travel departments in order to ensure that the most efficient way of meeting within the company

The roadmap states three goals for the EU:

1. ICT is recognised as an important part of the solution for combating climate change in Europe
2. Key actors have a climate change strategy for ICT
3. Concrete "ICT – Climate Change" programmes are initiated in Europe by 2007

The goals are designed to provide guidance for the work and provide a framework for the discussions with relevant decision makers in the EU.

Communication

We need to communicate our opportunities. If communication and awareness-raising are conducted by a third party, the message is more credible and hopefully more acceptable for the decision makers, encouraging them to act accordingly and really take advantage of the opportunities telecommunications offer for combating climate change.

TeliaSonera is one of the partners in the Centre for Sustainable Communications, a centre of excellence established in Sweden in 2006 and co-ordinated by The Royal Institute of Technology in Stockholm. The centre aims to create and develop new, innovative tools and methods for communication, e.g. providing viable alternatives to physical travel and transportation, thereby supporting growth and inclusion while reducing our consumption of natural resources.

References

Read more about TeliaSonera's Corporate Social Responsibility work at
http://www.teliasonera.com/article/0,2858,l-en_h-12628,00.html

Read more about the ETNO-WWF initiative at
http://www.etno.be/Default.aspx?tabid=1123

Read more about The European Environment Agency and GHGs at
http://www.eea.europa.eu/pressroom/newsreleases/GHG2006-en

Read more about the GeSI initiative at
http://www.gesi.org/

Read more about the Centre for Sustainable Communications at
http://130.237.3.242/?q=node

Read more about Kyoto Plus Conference at
http://www.kyotoplus.org/

Advanced technologies for Paperless Work: Myth and Reality

Jorma Jokinen
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Paperless office in itself is nothing new. According to Wikipedia, Paperless office was a visionary or publicist's slogan, supposed to apply to the office of the future. The suggestion was that office automation would make paper redundant for routine tasks such as record-keeping and bookkeeping. The concept came to prominence in the days of the introduction of the personal computer. An early prediction of the paperless office was made in a Business Week article already in 1975. While the prediction of a PC on every desk was remarkably prescient (or, regarding it as marketing talk, very effective), the paperless nature of office work was less prophetic. Printers and photocopiers have made it much easier to produce documents in bulk, word-processing has deskilled secretarial work involved in writing those documents, and paper proliferated.

"A visionary or publicist's slogan, supposed to apply to the office of the future". I remember studying in the Helsinki University of Technology one of my friends actually made his PhD thesis in a paperless mode in the very early 80's. However, what most of us experienced was that the amount of paper was increasing. It was so much easier actually to distribute documents and to print documents that everybody printed and distributed them quite carelessly all over the place - printed them, threw them away, and printed them again. Since 1975 when the prediction of the paperless office was initially made in the Business Week article, the usage of paper has radically increased because of the new information technology. It became so much easier to send-print-throw away, send-print-throw away, even for a company of Accenture's size with 140,000 people: 140,000 potetial recipients for a mass mailing!

We like paper because there are so many excellent qualities; it's very comfortable to read, it's very easy to hold, it's easy to manage - you can take your papers with you, it's good for handling because it's easy to scribble notes and make underlining and comments on the margins. Paper is really easy to manage and I think that's one of the main reasons for its longevity.

But there are many things paper is not so good at. It's not easy to find information when you have piles of paper on your desk. It's also very difficult to work globally, if you have distributed teams and you need to exchange information in more or less real time between India and Finland for example. Many of the services and tasks today in the globally shrunk environment, in this totally flat, totally borderless environment, are being done close to the client or are gravitating to the place in the world where it's the most cost-efficient and where the productivity of doing them is higher. When we follow these trends we have to digitalise information, to copy and mail it. And with the amount of information increasing, we have also got space problems - and have started to hate binders.

We already have technologies that have the good qualities of paper without the bad ones. Desktop search is now widely available and we have ad hoc collaboration tools by which we can easily build teams that work across borders or across organisational lines. Connectivity is getting better and better so we don't really need to carry our papers or documents with us but we can always have remote access to the information that we need. Storage technologies develop in the way that we can have terabytes of storage capacity in your PC very soon.

This presentation was actually made using paperless technologies; I never had a meeting with the colleagues who advised me - we worked on-line, we didn't drive a single kilometer to meet physically and nobody had printed out anything before today. Everything was put together using basic technology - nothing was really ground-breaking. And it was very cost-efficient. Mobile networks and mobile phones are productivity tools for many things: e-mail browsers, presentations, word processing, and access to corporate data. All of that is today everyday technology.

How to do the transition from a paper-field to paperless office? This is mainly about behaviour and corporate culture, not about technologies. We need to awake in ourselves the curiosity of the little kid. Children and Teenagers are now born and raised in a digital environment and actually try out all these new technologies in a very natural way. When I begun my studies at the Helsinki University of Technology and tried to program a computer I had to punch cards. Development has been relatively quick, even to my generation. Teenagers are attracted to the new technology, and they are willing to use it and take the full power of it. And

of course the adoption of new paperless technologies has a positive impact on the competitiveness of our companies and our society.

There have been studies in Finland about the relation of GDP growth and information technology, for example by Markku Pohjola from the Helsinki School of Economics. His estimate is that roughly half of the GDP growth in Finland during the last 10 years can be explained by information technology. And he has seen correlations between the much quicker growth rate that US has experienced compared to Europe, and the usage of communication and high technologies. The EU has also recognised that we need to increase competitiveness by the usage of new technologies.

I think we already have the technologies available. Adoption is sometimes low, but it's picking up right now. The older ones are always the slow ones and they have to move a bit outside their comfort zones.

Moving into the paperless world in general means also that we enable information searching, sharing, collaboration more efficiently. Its a "whatabout" of our own behavior change. Let's leave behind us the old sayings like "information is power" or information is whatever. The key to competitiveness is sharing information and collaborating instead of trying to keep information behind closed doors. It's a big challenge for anybody of us to keep up with the technological development but it's also exciting and rewarding.

ICT for Environmental Sustainability and Growth in the 7th Framework Programme

Márta Nagy-Rothengass
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In March 2000 the Lisbon Council of Ministers agreed that by 2010 Europe should "…become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion." The renewed Lisbon agenda (2005) aims at markets and competition in Europe, a more attractive place to invest and work, knowledge and innovation for growth and creating more and better jobs.

To be a genuinely competitive knowledge economy, Europe must be better in producing knowledge through research, diffusing it through education and applying it through innovation. The European Research Area is a "single market" for research with free movement of knowledge, researchers and technology and increasing co-operation. The 7th Framework Programme will provide about 50.5 billion Euro of support to European research over the 2007-2013 period (Commission modified proposal, May 24, 2006). 32.3 billion Euro will be assigned to transnational cooperation (from collaborative projects and networks to the coordination of national programmes, to gain leadership in key scientific and technology areas). 27% of these (9.1 billion Euros) are related to information and communication technologies. If we have a deeper view on this topic, we find the issues of
- Miniaturisation (from micro to nano scale electronics)
- ICT drawing on other sciences and technologies
  (e. g. ICTs inspired from the living world)
- Systems able to learn and evolve (advanced robotics)
- Convergence (computing, communications and media technologies)

Among the key societal challenges is the need for a new way of using ICT digital content and the role of ICT as a facilitator for more efficient public services. It helps modernise administrations and public services and allows more participation in democracy and public life.

In the environmental area we are challenged by an increasing demand for natural resources:

- 1-2% per year for energy and growing water consumption.
- Natural and industrial disasters has doubled in one decade, killing 500.000 people and causing more than 600 billion of damage.

In the Work Programme, a total of 24 objectives is expressed within 7 challenges. On the horizontal level we have the basic technologies: network and service infrastructures (No 1), cognitive system interaction and robotics (No 2), components and systems engineering (No 3). On the vertical level issues are added like digital libraries and content (No. 4), ICT for health (No 5), ICT for mobility and sustainable growth (No 6) and ICT for independent living and inclusion (No 7). The draft issues related to challenge No 6 are

- Safety of vehicles and their energy efficiency have improved, but the "zero-accident scenario" is still a distant goal and current vehicle active safety (driver warning, hazard detection …) is still limited to stand-alone systems
- Risk management systems provide isolated solutions, no co-ordinated ICT-triggered alert of rescue and security forces
- Infrastructures are not sufficiently energy efficient (transport, buildings, production)
- Intelligent Vehicle Systems including secure and reliable vehicle-to-vehicle and vehicle-to-infrastructure communication systems and optimised traffic management at large scale and mobility services
- Fully integrated management systems for warning and reacting to environ mental and other risks
- Intelligent monitoring of energy production, distribution, trading and use

We are heading for a "Single Information Space for the Environment" in Europe. For that purpose we need

- Collaborative systems for environmental management
  - From monitoring to reporting, management, alert and response
  - Enhanced capacity to assess population exposure and health risk
  - Visionary concepts, as well as evolutionary integrated systems
  - Generic solutions with typical validation focus on water and air

- Coordination and Support Actions
  - Adoption of common open architectures (INSPIRE, GMES, GEOSS)
  - ICT research for risk reduction and disaster and emergency management
  - ERA-Net in the field of ICT for environmental sustainability

Further information:

European Research (2007-2013) on the Web:
http://cordis.europa.eu/fp7/home.html

Expert Registration:
http://cordis.europa.eu/experts/fp6_candidature.htm

Cordis Web Site:
http://cordis.europa.eu/ist/environment/index.html

DG INFSO Unit "ICT for the Environment"
Mailbox: INFSO-G5@ec.europa.eu

GEO: http://earthobservations.org/
GMES: http://www.gmes.info/
INSPIRE: http://www.ec-gis.org/inspire/

Finland's Information Society Strategy 2007-2015

Ville-Veikko Ahonen

Programme Coordinator, The Finnish Information Society Programme

Finland's information society development is proceeding very well. The World Economic Forum has ranked countries that are the most competitive in the world. Finland was No 2 on the list. And Accenture, has ranked countries in the world which are the most developed eGovernment providers in the world. In the survey done 2005 we were ranked No. 3. But in a new survey in the spring 2006, we were ranked to be clearly one of the reformed leaders in the economic sector of the world. The active work related to information society strategy building and the Information Society Program can be recognized as the strenghts of Finland. One of the reasons why we are doing so well in these comparisons on the international level are Finland's R&D investments. Only two countries are ahead of us with respect to R&D investments: Israel and Sweden.

In 2003 we only had some 300,000 broadband connections in our country (there are 2.4 million households in Finland) and most of our country was not connected to the speedy networks of the information society. Now we have about 1.4 million houshold broadband connections which means that lot more than 50% of the housholds are connected. And every library in Finland is providing free of charge Internet terminals to their customers. Finns are very enthusiastic to use those networks and connections. About 80% of Finns nowdays use them frequently - a remarkable figure in the international comparisons, the EU average of the Internet usage is 47%. In our opinion the sustainable development of the information society means also inclusive information society. So we still have to do a lot of work to get all the age groups involved in this process.

R&D funding was mentioned as one success factor - but there are others like trust. Finns trust the public sector and the companies, and therefore they trust the e-services providers, organisations or sectors. 90% of Finns consider e-banking to be safe. Nevertheless there are a lot of challenges ahead like aging population (Finland is one of the first nations to face the aging population), boosting up the productivity in the public sector.

Our municipality sector is now employing about 450,000 people. And by the end of this decade about a third, meaning 150,000 people, will retire. That's one of the things that are pushing the government forward to build the information society. How can we maintain the sustainable welfare system in the future, if all the workers are retiring? That's why we need the ICT. The information society issues have been given high importance by the government. In 2003 four policy programs were launched, which are the key policy areas for the government. And those four policy programs are employment issues, civil participation issues, and enterpreneurship issues, and the fourth one is the information society issue.

The Infomation Society Programme works directly under the Prime Minister who is leading a group which meets every month to discuss issues relating to the Information Society Program like meaning funding, steering projects and launching new projects. Our work is also supported by the Information Society Council, which is a body consisting of people from companies, the third sector etc. In the Information Society Programme there have been about 140 different funded measures. The ministry has implemented the broadband strategy, because we should have reasonably priced broadband connections all around Finland. We centralised our IT functions in the government, and also the municipalities have formed a new cooperation unit under the ministry of internal affairs. We have information society campaigns in our program, on TV and in libraries for instance and we have trained library staff in Finland. We are forming a national electronic base or data archive. It means better inormation for citizens, better information for doctors and helps saving costs as part of the welfare state policy.

On 26th September 2006 the National Knowledge Society Strategy has been published. It gives us a vision, but it also gives us concrete things that we should do in our next governments term of office. We want to create a nationwide vision for the companies, for the public sector and for the third sector, how the information society should develop in the future. And we define the sectors for the information society development where we want to push development forward. Finland is a small nation in the world, so we can't develop all things by ourselves. Therefore we have to decide on priority sectors.

We have a good, free of charge educational system in Finland, we have a positive ICT culture, and we have an open and safe society. But we have still some

weaknesses: IPR questions have to be discussed and we still have some "silo thinking" in our society and in the public sector.

Finland will be a service society in the future by the means of the information society. Therefore we have also to develop our innovation system and improve marketing skills and the commercialisation of innovations. We also need to develop life-long learning. Trust in information society, compatible ICT functions, and the information society infrastructures are the foundations for our society as well as a balanced social and regional information society development.

Sustainable Wealth of Networks

Matti Penttilä

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The purpose of this presentation is to illustrate the possibilities of the new community-oriented networking to advance sustainability in very wide sense: social, political and economic. The historical perspective tries to illustrate the great (and failed) expectations of the late revolutions of electronic communications during the last one and half century and especially the last quarter of century. The huge global challenges of have become evident also to those people who used to deny all the environmental and global changes and threats. That is why all the forces and means have to be joined to turn the development towards sustainability. Here we try to find the prospects in the global network.

The utopias have inspired both the engineers and the people benefiting from the new inventions. Especially the new communication means have brought great hope to change the societies into more open, democratic and equal direction. The improved methods for communication and interactions have inspired the pacifist and peace activists to foresee the prospects of peaceful world, as the conflicts and wars have been the result of bad communication and hitherto misunderstanding. The optimists were expecting already the early telegraph to make "wars unnecessary", not to mention the more advanced communication means.

Also the backwardness, ignorance and deficiency of knowledge has been seen a result of "lack of information", which can be cured by more or better information through mass or more personalised media. Huge expectation has been burdened onto broadcast radio and TV to help even the illiterate people to gain from the fruits of advanced information. When media has changed to more interactive especially during the internet era, the anticipation of active civil participation in social life has been great. (We do not here consider the percentage of global population with internet access and its distribution in the world.) The last years of more user community oriented internet use – so called Web 2.0 - has once again raised the hope for improved democracy, transparent business practises and more equal as well as more responsible communication. The question in this presentation is: Could this progress advance also sustainable development?

The expectations to promote more environmental and equal trends by advanced ICT have been immense during last decades. Even Soviet system wanted to steer the production and society by their socio-cybernetic systems efficient way. Newer utopias have included slogans as Nicholas Negroponte's "Bits instead of Atoms", "Communications instead of travelling", "Electronic instead of printed media", "Flexible work instead of offices", not to mention "Paperless office", which is handled in the other presentation of this event. More social echoes can be heard in "Global Village" or "Equal access to all" or "Participation instead of voting". We have seen a massive increase in the information flow but unfortunately the atom flow has increased hand in hand with bit flow, need of office space (and office paper) has increased together with electronic communication. Despite of the improved energy efficiency per unit, the forecasts of energy consumption used for ICT infra and equipment show figures up to one third of all the electricity use in 2020 in USA, not to mention all the non-recycled electronic waste. Information content and means of access have skyrocketed, but not equally.

One of the most cited writers, Professor of Yale, Yochai Benkler (http://www.benkler.org) argues in his massive book "The Wealth of Networks" that a new economy is possible. Understanding human beings as selfish, utilitarian, rational agents leads to the economies, where laws of jungle benefit the small minority, and eat up the possibilities to more sustainable production, consumption and life-style. Benkler sees people behaving non-instrumental way, acting for gratification, appreciating social connections, targeting to self-esteem and capable to altruism. This should be evident for everybody – even for the old school economists.

In the network we have a huge number of examples that create value and benefit common good, but are produced on the voluntary basis. Some familiar examples are

- Open Source Software movement which is challenging the whole way of software business quite successfully. Let us see how the 100 dollar laptop based on Open Source changes the way how the ICT is distributed and utilised in developing countries.
- Wikipedia and other free encyclopaedias. Wiki had five million articles last

summer, and its trustworthiness rivals with the best commercially published encyclopaedias. Achievement is huge considering that writing formal articles and definitions is not a typical way of human expression.

- SETI@home project has attracted five million home computer owners to give the idle time of their processors and free space of their memory to search for extra-terrestrial intelligence from the white noise of electromagnetic radiation from space.
- Citizen Journalism/Media is challenging and complementing the traditional media. It is difficult to censor and control, which means more options in closed societies, and more points of view in open societies. ("BBC will pay for citizen journalism", 17 Nov 06)
- YouTube & and other network spaces had a remarkable impact on the last Congress election in USA:
- Network Petition can give a voice for the small person when fighting against wrongdoings and injustice.

Two quite different examples of the power of networks are introduced below, when wrongdoings and injustice is revealed and challenged. The first case is familiar to Finns, but maybe not known internationally.

CASE Tallink

Baltic Sea is one of the busiest sea routes of the world. The ferries crossing the narrow Gulf of Finland bring seven million passengers annually. The Gulf is merely a puddle. The sea is extremely vulnerable ecologically as the average depth is only 38 metres, less than the height of the big ship. Tallink is the leading Shipping Company in the Baltic Sea area. Last year the newspapers revealed that the Tallink ferries are dumping their waste water directly into the sea, although the harbours have proper facilities to deal with their septic tanks. The immediate response from the company was "not true". Next day they had to admit, that they dump the waste water "but we purify it before dump". Now the social media in the internet had condemned the ruthless behaviour of Tallink and published the boycott petition against the company. The campaign was extremely efficient. In one day tens of thousands people had signed the petition including the statement that they are not going to use the services of the company until the waste water is properly treated. The next day Tallink announced that it starts to empty the septic

tanks of their ships in the harbours to be properly purified by the waste water treatment systems of the cities.

The second example is personally important to the author who was working in Nepal Telecommunications Corporation 1988-90.

CASE Kathmandu

During the first months of 1990 the so called "democracy movement" of Nepal including all the political parties came to public with the demand on new constitution and parliamentary democracy. The absolute ruler King Birendra did not give up and sent army against the peaceful demonstration of 200,000 people. The marching crowd was mowed down by heavy machine gun fire and hundreds of people lost their lives. After all, the King had to step down and accept the democratic constitution and constitutional monarchy. The situation was quite similar when the late Birendra's brother, Gyanendra had sized the absolute power from parliament, democratic government and the parties in 2005. The new democracy movement in spring 2006 was even bigger than 16 years before. Now the cameras and mobile phones were everywhere and the palace did not dare to use the excess force to crush the resistance. The cellular network was turned off several times to hinder the organisation of demonstrations. It did not help, and the King had to hand over the power to the democracy movement, which is now drafting a republic constitution. In the whole conflict the total number of casualty was only 15, which was only a small fraction of the death toll of democracy movement of 1990. At least one reason to the difference is the power of communication: not the cruellest tyrant wishes to see the results of his brutal acts in the global TV-network or circulated by YouTube.

The early Internet was based on voluntary communities; business models are new, emerging from surprising directions, as Google shows. In addition to super-nodes (Yahoo, Google, MSN...), the current Internet sees the new communities in larger scale: search engines have made also the long tail visible. Social Media tools e.g. Technorati make millions of blogs visible to anybody. Users want to share their knowledge, achievements, opinions, experiences in all available ways. Creative Commons offers new ways for publishing, Citizen Journalism creates new transparency to the business and decision making, and design by customers provides a

direct channel to the product development. In this process, how can we find the path to the more sustainable world?

When expanding, the market economy searches space for new products, and the media and advertisement apparatus has to create novel needs for people. The needs are connected to desirable lifestyles, which have globally turned more and more unsustainable. To change the direction of the trend, we need to redefine the needs. Classical example is the argumentation:

- I need a car.
- What for?
- To travel from a place to another.
- What for?
- To meet my colleagues and customers.
- What for?
- To have business meetings.
- What for?
- To negotiate about my contracts.

The need in this case is not a gasoline consuming two ton vehicle. The actual need is efficient communication that can be organised in many ways which do not need heavy travelling.

The (Internet) communities could raise the issues that have significance in the market. Until now the car market has puffed off with horse powers, read: high energy consumption. When we are going towards the strict quotas of greenhouse gas emissions on every possible level of production and consumption, we will logically have personal quotas of emissions in the end. If we want to make the greenhouse gas market efficient, it cannot be only national and international level, but the individuals should gain advantages when not producing harmful substances. That will transfer wealth towards sustainable lifestyles, and create positive publicity for the people (or life-style) with lowest emissions.

The sustainable trends have to be promoted fashionable also in Mandarin, Cantonese, Hindi, Urdu, Bengali, Bahasa Indonesia and all the other languages.

Information and communication technologies have an increasing impact on nature. They facilitate monitoring and provide politics with reliable data. But IT is also a large consumer of energy, IT ends up as harmful waste and has indirect effects. Instead of having the paperless office, we are flooded with paper and mobility and transport are not only substituted but also enhanced.

Increasing environmental impact calls for new solutions and those countries and companies which think early about the future will provide successful products.

How can we both increase competitiveness and provide IT products and services in an environmentally friendly way? The symposium "Information Technology, Competitiveness and the Environment" discussed problems and presented best practice. It showed that environmentally oriented innovation is one of the key factors for competitiveness. The symposium on 20 November 2006 was hosted by TeliaSonera in Helsinki and was organised by the Finnish Association, the Brussels-EU Chapter and the European Support Centre of the Club of Rome in co-operation with the Finnish EU Presidency and the Finnish Information Society Programme.

THE CLUB OF ROME
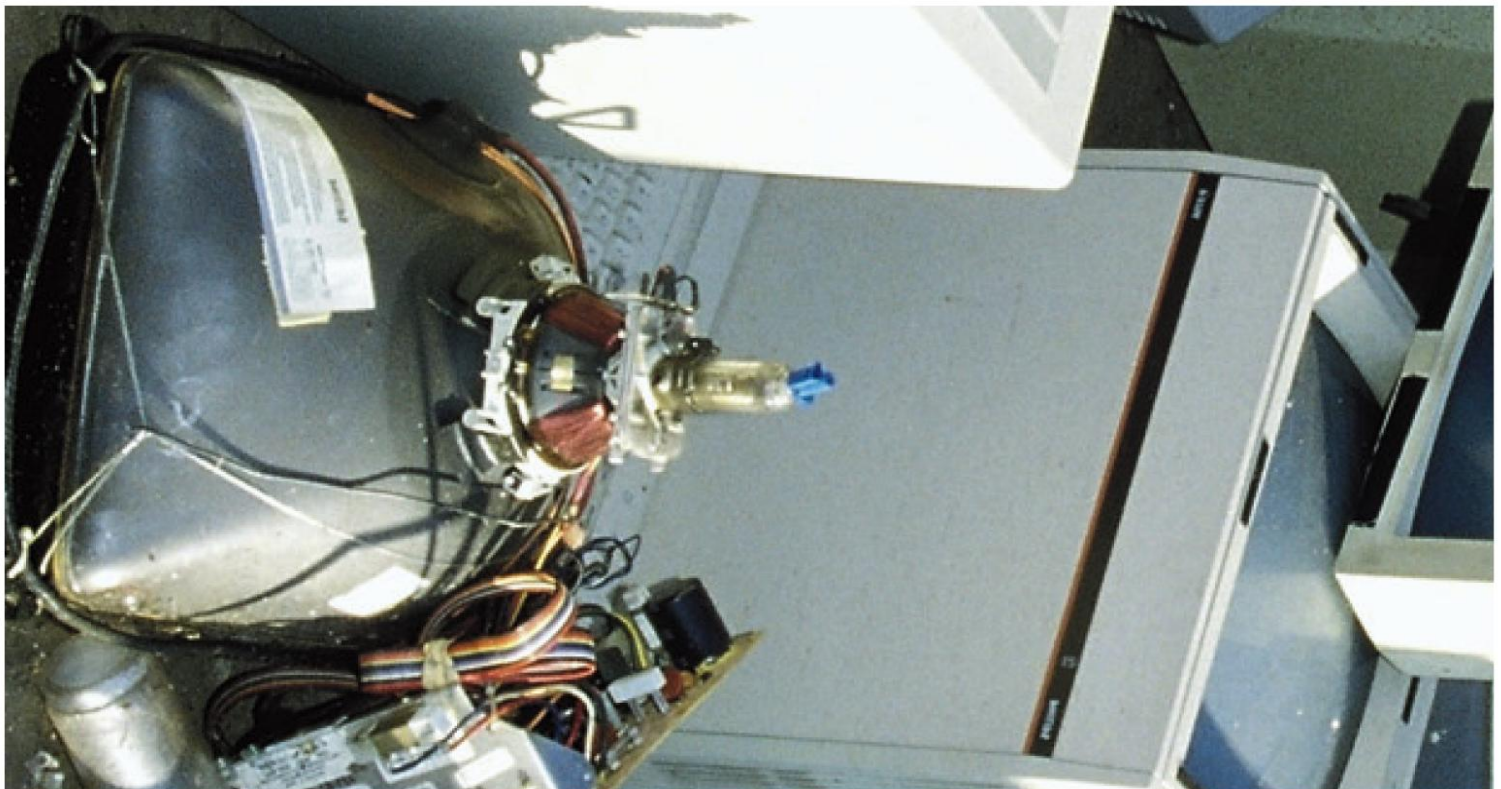
Finnish Association, Brussels-EU Chapter
European Support Centre

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