

## e-business and CSR – the business case for the new economy. Corporate responsibility challenges and opportunities for e-business and ICT companies

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### Abstract

*E-business as well as the information- and communication technologies (ICT) it is build upon, are often perceived as agents to enhance the quality of life, to create a knowledge-based society and to contribute to a more sustainable society. Yet, scientific evidence verifying these perceptions is so far lacking to a large extent.*

*Given the trend toward inclining business responsibilities towards corporate social responsibility, this paper will firstly explore the environmental and social aspects of prime importance for corporations working in ICT and e-business sector. The identification will centre around the question of what are important environmental aspects connected to the sectors and which effects e-business has on companies' social responsibility. Case studies conducted in co-operation with business partners from the ICT as well as the e-business sector in the context of a pan-European research project called Digital Europe will be the main source for the identification.*

*Having identified the CSR aspects relevant for the e-business sector, the paper goes on and looks at how these issues are currently taken up. CSR aspects addressed and approaches*

*taken by leading companies and important sectoral organisations will be looked at and an overview of the sectors performance conducted.*

*Comparing the CSR focus areas identified with the approach and response currently taken, the paper concludes with an outline of recommendations on how businesses engaged with ICT and e-business activities might proceed towards sustainability.*

### The ICT and e-business sectors sustainability aspects

E-business as well as the information- and communication technologies (ICT) it is build upon, are often perceived as agents to enhance the quality of life, to create a knowledge-based society and to contribute to a more sustainable society. Yet, scientific evidence verifying these perceptions is so far lacking to a large extent. Given the trend toward inclining business responsibilities towards corporate social responsibility, this paper starts with exploring the environmental and social aspects of prime importance for corporations working in ICT and e-business sector. Having identified the CSR aspects relevant for the e-business sector, the paper goes on and looks at how these issues are currently taken up, before recommendations for business are outlined.

Research into sustainability and ICT as well as its applications needs a conceptual framework that helps to structure the various aspects and implications, as well as to present a concise picture that allows to identify and highlight the opportunities and risks of the new technology. Based on the three dimensions of the triple bottom line approach (Elkington 1997), the effects caused by ICT and its applications can be further divided in those caused by the ICT infrastructure (primary effects), the application and use of the ICT (secondary effects) as well as by changes in consumption pattern (tertiary effects).

**The ICT sector:**  
 is defined based on the statistical definition in an OECD publication (OECD 2000). The OECD used a definition agreed on by the “Working Party on Indicators for the Information Society (WPIIS)”, which includes among others manufacture of office machinery, computers, communication equipment as well as post and telecommunications.

**The E-business sector:**  
 comprises of companies which deliver digital technology services as a significant part of their core business or use digital technologies as one of their prime channels to market. E-business as a concept refers to transactions using these technologies, such as. e-commerce and e-government.

*Table 1: Categorisation of sustainability effects caused by ICT and e-business (adapted from EITO, 2002).*

Effect \ SD Dimension	Environmental	Social	Economic
<b>Primary effects:</b> caused by physical existence of ICT devices (life-cycle wide focus)	Aspects	Aspects	Aspects
<b>Secondary effects:</b> derive from use of ICT for existing habits/tasks	Aspects	Aspects	Aspects
<b>Tertiary effects:</b> new habits or patterns that arise through use of ICT	Aspects	Aspects	Aspects

Focusing on the primary and secondary effects, the paper will explore the environmental and social aspects, based on case study research conducted with business partners from the ICT and e-business sector in the context of a pan-European research project called Digital Europe<sup>1</sup>. Other studies have been integrated to complement the identification, which centres around company external issues, i.e. of prime relevance in supply chain management or stakeholder oriented communication.

### Environmental aspects

Within Digital Europe’s environmental strand the research centred around the question to which extent e-business can contribute to dema-

terialisation and resource efficiency (Kuhndt et al. 2003). To address this question, case studies have been conducted, applying the Material Intensity Per Service unit (MIPS) concept developed at the Wuppertal Institute (Schmidt-Bleek 1994). Considering the entire life cycle, the methodology measures the amount of materials, water, air and soil-movements required throughout the products or services life-time. The part of the resources turnover - measured in tonnes, kilograms or grams - that does not enter the product itself, is commonly called its ecological rucksack. One case study looked at ICT equipment, taking the example of mobile computing devices (Geibler, Ritthoff & Kuhndt 2003). Others focused on the application level by exploring

different ways of delivering digital music (ranging from CD-retail to digital delivery) as an example for product-based e-commerce (Tuerk et al. 2003a). A comparison between traditional banking and online banking served as a proxy for service-based e-commerce (Tuerk et al. 2003b). Focusing on the impacts e-business will have on transport, a forth case study explored the potentials of telework, teleconferencing and teleshopping (Schallaböck et al 2003).

Among the most important sources for resource consumptions at the level of the ICT equipment (primary effects) is the **electricity usage** of the network access devices (PC, Notebook), content providing devices (e.g. servers) and intermediate devices (e.g. Routers, 'Switches' or 'Gateways') as well as the data transfer media (e.g. backbone lines and local area networks). In Germany, the life-cycle electricity consumption of the entire Internet infrastructure is estimated to account for three to four % of national consumption, whereas the use phase only accounts for about 1.5 to two % (Türk 2001). For the U.S. current estimates come up with about three % of the electricity consumption (Laitner 2003). The future energy demand by the Internet is most likely to increase. Initial estimates of future energy consumption point out that the electricity demand from the Internet in Germany could increase up to more than six % of total electricity consumption by 2010 (Barthel, Lechtenböhmer & Thomas 2001).

Taking end appliances as an example for an assessment of the production of ICT devices in general, a case study reveals great significance for the **material consumption** within the product's life cycle (Geibler, Ritthoff & Kuhndt 2003). Even for a compact and supposedly energy-efficient notebook, the production induced almost the same quantity of resources as the use phase (40 to 50 % of the total, depending on user behaviour; the other large share are the resources required to generate the electricity for

the use phase). This is the result of the components' material content with intensive upstream processing demands for components such as printed wire boards (PWBs), displays (LCDs), chips and precious metals.. Most of the materials used originate from **non-renewable sources**. Further, it must be assumed that the share of recycled and reused raw materials in end appliances is low.

E-commerce, as one important application of ICT, can – under specific circumstances - provide significant resource efficiency potentials (secondary effects). A categorisation between product-based and information-based e-commerce turned out to be helpful to differentiate the dematerialisation potential. Information-based, i.e. not based on any physical product but on information only, can be considered advantageous compared to product-based e-commerce. In particular, commerce types that can be potentially changed **from products to services** (information) hold a significant dematerialisation potential (Kuhndt et al. 2003). A music-server for example can serve a tremendous number of consumers as storage media for music, which is why online music potentially has low material intensity per service unit. In addition, it renders the production and retail infrastructure as well as transportation (and therefore the resource flows connected to it) unnecessary. In particular resource savings connected to the building infrastructure and **land-use** appear to be relevant. Reducing the impacts caused by these aspects, **energy consumption** turns out to be the most important aspect in information-based e-commerce scenarios, constituting up to 70 % of the total material intensity. Regarding product-based e-commerce the potential dematerialisation potentials appear to be small. The case study findings suggest that depending on the circumstances product-based e-commerce might even be more resource intense than traditional retailing business (Tuerk et al. 2003b).

But whether or not the existing resource efficiency potentials can be reaped depends to a large extent on businesses and consumer habits as well as rebound effects, which are likely to have a counterbalancing influence (Plepys 2001). Increased efficiency saves materials, resulting in resources becoming less scarce and therefore less expensive. A fundamental micro-economic rule dictates that a price reduction will lead to an increase in demand. If this increase outweighs the (technological) efficiency gains, the overall consumption will rise and economists talk about the so called 'rebound effect'. A few examples are:

- Internet will reframe markets, enabling companies and consumers to buy globally, which potentially increases transport demands;
- flat rate internet access might reduce (economic) incentives for web users to disconnect from the Internet between sessions, resulting in an increasing energy demand, even if the PC itself is in sleep mode;
- consumers tend to re-materialise digital information. Examples are music files burned on CDs or the tendency to print out most digital documents. The case study on digital music highlighted, that this habit might even overcompensate the savings from a purely digital distribution.

Next to resource efficiency, the environmental research strand explored also another priority area, namely **transport** (Schallaböck et al 2003). Modern and forthcoming ICT can potentially save transport, either by substitution of physical transport or by a more sophisticated organisation of transport. The study found that potential for transport saving through home-based telework is not more than two % of the total sum of passenger transport. There are some indications that mobile telework and teleconferencing might overall stimulate additional transport, even though these rebound effects are hard to quantify. Even less advantageous is tele-shopping,

that does not seem to contribute to transport savings. This result is based on the simple finding, that tele-shopping requires additional delivery transport, while it appears unlikely to substitute shopping trips on a regular basis. Another study that assumes a substitution of private trips through the usage of tele-shopping concludes, that depending on the delivery model used, GHG emissions generated from grocery shopping in Finland can be reduced to up to 87% (Siikavirta et al. 2003).

Next to the aspects that have been in the focus of the case study research, there are others that need to be mentioned. **Toxicity** is clearly one of them. The toxicological and hazardous potential of ICT can be illustrated by semiconductors, which are a crucial component of almost all Internet devices. The production of semiconductors, involves about 200 different materials and 100 proprietary methods (Freeman 1995, , p. 641). Production requires a large amount of hazardous chemicals and is energy intensive. Heavy metals, waste solder, arsenic, waste epoxy and organic solvents are included in the solid waste fraction from semiconductor manufacturing. Air emissions are often toxic; reactive and/or hazardous gasses, solvents or particulates. Effluents from wafer production can be highly in acid and acetate, metals and fluorides can also be present (World Bank Group & UNIDO 1998, p. 303). An inventory of the elements that can be found in a PC covers large parts of the metals and non-metals listed in the periodic table, ranging from A (aluminium) to Z (zinc) (Türk et al. 2002, p. 115). Silicon Valley, a centre of the computer industry, contains more Superfund sites than any other region in the U.S., and there are 150 locations with groundwater contamination (Thorpe & Smith 1998, p.1).

**Waste electronic equipment** contain large quantities of recyclable metals such as copper and iron, as well as heavy metals such as lead, zinc and cadmium. Much of the metals in mu-

municipal solid waste (MSW) stem from these appliances. The pollution potential of electrical and electronic appliances (heavy metals, plastics containing halogenated flame retardants), added to the immense quantities produced annually, has rendered the necessity for separate collection system (Swiss Agency for the Environment, Forests and Landscape, 1999, p. 33). The main concerns are the premium on landfill space and the toxic potential of electrical and electronic equipment (EEE) to be released to the environment especially during and after incineration. The waste stream, which is growing at a rate of three times the level of average municipal waste (Commission proposal 2000), is since 2003 a subject to legal regulation within the EU (WEEE and ROHs directive) (EU 2003a, EU 2003b).

## Social aspects

Another thematic strand within the Digital Europe project conducted by Forum for the Future explored the social responsibility in the information society (Alakeson et al. 2003). Discussing the social impacts of business and technology in the “Information Society”, the study focused on the internet and mobile telephony as two of the most prominent and transformative technology applications. Based on case studies with large corporations and regional bodies as well as a survey among companies investigating the link between the use of e-business and the corporate responsibility performance, eight key areas of impact have been identified. Areas, where “technology creates clear risks and opportunities for the contribution of business to the society (Alakeson et al. 2003, p.23)”. These areas are considered to be comprehensive enough to provide a reasonably rigorous framework for looking at the interface between business, technology and society. They can be therefore considered to describe important social aspects for the ICT and e-business sector.

- Increasing need for **technological literacy** centres around the importance of digital inclusion in a living and working environment increasingly reliant on ICT applications. For an increasing number of employees, ICT skills are a fundamental prerequisite in their daily work.
- Increasing **access to information** is about the two sides the easy access to information brings about. While on the one side an information overload might cause stress to many individuals, the availability of information empowers employees and citizens and is a fundamental basis for corporate accountability.
- Virtualisation of products has been discussed as “**shift from products to services**” in the section on the environmental strand. Yet, from a social point of view the consequences might lead to backlashes. While for example online banking is a convenient way of banking, it excludes those who are not in the position to access or use a computer.
- **Changing working patterns** is about the greater flexibility in working life but also the risks it brings about. Issues such as overwork and isolated employees need to be paid attention to.
- **The creation of a distinct, virtual space** discusses new ways people meet, communicate and create (online) communities as a new form of social relationship. But how real are these new relationships and do they undermine the non-virtual space?
- The **rise of networks** might change traditional administration and leadership roles and concepts, opening up more open and egalitarian organisations. But are the new forms really more open and democratic and how to address the uncertainties connected with them?
- Increasing **speed** discusses the pros and cons of an ever increasing speed brings to society. Being connected to a communication infrastructure every time, everywhere allows to access “real-time” information, but compromising on the time to pause and reflect.

- The increasing importance of **trust** covers how the wealth of information available every time, everywhere erodes traditionally trusted positions and makes building trust more difficult .

While the study mentioned above looked primarily at e-business and telecommunication applications and usage in Europe, Amnesty International and The Prince of Wales International Business Leaders Forum (IBLF) produced a world map for the IT Hardware and telecommunications sector. The map depicts where human rights abuses and violations exist and where leading multinational companies are at risk of being associated with them (Amnesty International & IBLF 2002). The reasoning behind this map is, that the extent to which business is exposed to risk depends on where the company operates. Many transnational corporations operate in countries with human rights conflicts and violations, ranging from repressive administration, the ban of free trade union activities to arbitrary arrests, torture or governments skewing state expenditure in favour of the military to name just a few. Each of these situations creates risks, which, if mishandled, may lead to litigation, extortion, lost production, sabotage, higher security costs and increased insurance premiums. Other consequences may include restricted access to capital, difficulty in recruiting the best staff, and ultimately, reputational damage. Of particular relevance to the IT and telecommunication sector is the sourcing of raw materials and components from developing or transitional countries, where suppliers may be associated with e.g. child labour, poor enforcement of international labour standards or human rights abuse. Under the spotlight are in particular the following issues (Amnesty International & IBLF 2002):

- **Freedom of expression:** Technology used indiscriminately to monitor private e-mails or censor internet access, contravenes fundamental human rights[VT1]. Sun Microsystems and Cisco Systems, for example, are among those to have come under criticism from NGOs such as Human Rights Watch for allegedly supplying the Chinese authorities with the tools and technology to censor the internet and thereby curtail individuals' freedom of expression.
- Any companies found complicit in the use of **forced labour** may be subject to intense media or public scrutiny. The use of Coltan[VT2], an exceptionally temperature-resistant conductor in printed circuit boards, mobile phones etc. is one example where ICT companies may be associated with forced labour through inadequate monitoring of their supply chains[VT3].
- **Links to repression:** A company that sells equipment knowing that it could be used for repressive purposes may be seen as a partner in repression. E.g. Human Rights Watch called on Motorola in February 2001 to reassess its promotion and sales of communications equipment to the police in China[VT4].
- **Access to knowledge:** The potential human rights risks to which ICT companies may be exposed are not isolated to supply chain or end-use issues relating to developing or transitional countries. Companies may also face human rights questions over the 'digital divide' between those with and without access to the IT revolution, being it within a country or between developed and developing countries[VT5].

The following table summarises the environmental and social aspects identified to be of importance for the ICT- and e-business sector.

*Table 2: Environmental and social aspects of importance for the ICT- and e-business sector.*

Environmental	Social
Energy	Technology literacy
Materials	Access to information
Land use	Shift from products to services
Transport	Changing working patterns
Toxicity	Creation of a virtual space
Waste Electronic Equipment	Rise of networks
	Speed
	Trust
	Freedom of expression
	Forced labour

## Addressing the sustainability aspects

Having identified the sustainability aspects relevant for the ICT and e-business sector, the question arises how these issues are currently taken up by the sector. Which aspects are addressed and which approaches taken?

Acknowledging the increasing expectations from various stakeholders to integrate environmental, social as well as ethical issues into corporate decision-making processes, pro-active companies have started to apply a range of sustainability management concepts and tools. One of the concepts that has drawn a lot of attention in recent years is **corporate social responsibility (CSR)**. CSR can be seen as a framework for businesses to integrate social, environmental and ethical concerns into the daily decision making processes. While there is as yet no generally accepted definition of CSR, the European Commission has e.g. released a communication on CSR in 2002 (Communication from the Commission 2002) and ISO is considering developing a management standard on it. In order to illustrate which subjects of sustainability are already on businesses agenda, CSR programmes and

policies of leading companies and multi-party initiatives, such as sectoral organisations, have been analysed. Together with other stakeholders such as the financial market, these multi-party initiatives can be seen as a driver for business to take up some of the aspects outlined. The examples given are neither exhaustive nor do they claim to give a representative overview.

Generally speaking, the need to address sustainability issues is recognised by large ICT and telecommunication companies. An international survey of sustainability reporting published by the CSR Network in 2003 found for the third year running, the Computers and Electronics sector to have the greatest percentage of reporters (90%) (csr network 2003). The Ethibel Sustainability Index (ESI), a free-float weighted share indexes selected by Ethibel but maintained and calculated by Standard & Poor's, provides a comprehensive perspective on the financial performance of the world's leading companies in terms of sustainability to institutional investors, asset managers, banks and retail investors. While the telecom services and information technologies sectors weight about six % resp. 11 % in the S&P Global 1200 index, they account for 11 % and 21 % in the ESI, indicating the sectors im-

portance with respect to sustainable development (ETHIBEL 2003). The picture is different when it comes to e-business companies. E-business as such doesn't specify a specific sector, but rather describes a sales strategy or channel, being it exclusive or just a supplementary one. The challenge to define an "e-business sector" in analytical or statistical terms has not yet been sufficiently addressed, so that information and data are hard to obtain.

Among the multi-party organisations, the *Digital Opportunity Task Force* (Dot Force) follows a very wide approach to deal with digital opportunities in general. The organisation grew out of a call at the G8 summit in July 2000 for more efforts to counter the global divide between those with **access to digital technology** and those without. The Dot Force, consisting of representatives of the public, private and non-profit sectors from both developed and developing countries, met for the first time in November 2000 to develop concrete recommendations for submission to the G8 meeting in July 2001. These recommendations, released in a report entitled 'Digital Opportunities for All', cover policy issues, initiatives for improving access and training requirements. The World Bank and UN Development Programme (UNDP) provide the Secretariat for the Dot Force (Dot Force 2003).

The *Global Reporting Initiative* (GRI) is an international, multi-stakeholder effort to create a common framework for the voluntary reporting of the economic, environmental and social impact of corporate activities (Global Reporting Initiative 2003a). The institutions goal is to enhance the comparability and credibility of sustainability reporting worldwide, elevating its practice to a level equivalent to financial reporting. In addition to the general reporting guidelines, GRI has started to develop sector supplements, designed to provide indicators highlighting the specific issues that characterise a given industry sector. The telecommunications supplement, targeting

producers and operators, will be among the first sectoral supplements available, listing a whole range of sustainability aspects as an outcome of a multi-stakeholder dialogue (Global Reporting Initiative 2003b). Being a multi-stakeholder process, it can not be considered as "business or sectors response", even though business has contributed significantly to the supplement.

The *Global e-Sustainability Initiative* (GeSI), launched in June 2000, is an initiative of Information and Communications Technology (ICT) service providers and suppliers, with the support of the United Nations Environment Programme (UNEP) and International Telecommunication Union (ITU) (Global e-Sustainability Initiative 2003). GeSI aims at promoting the Information and Communications Technology industry as socially responsible and progressive. It does so through a set of principles based on sustainable development, meaningful monitoring of environmental performance and responsible management of the 'fragile equilibrium' between economy, ecology and society. While GeSI as such does not specify any sustainability aspects they consider to be of particular importance for the sector, they initiated together with UNEP and GRI the development of a telecommunications sector supplement to the 2002 GRI reporting guidelines.

ETNO, the *European Telecommunications Network Operators' Association* was established in May 1992 and has become the principal policy group for European electronic communications network operators consisting of 41 companies in 31 countries. Their objective is to promote CSR with a traditionally focus on environmental issues which show the founding of an environmental charter but also social aspects. Regarding the environment, topics as **energy** conservation and **CO<sub>2</sub>-emission** reductions via telephone conferences and as well as **dematerialisation** are on the agenda. Socially, corporate governance is one big internal issue, including actions

to improve society, especially communication to enable and facilitate the ability to **gain information** via different media, i.e. the internet. One achievement is the harmonisation of sustainability reports of its member companies to improve comparability and transparency (ETNO, 2002).

Responses by individual businesses varies widely. Generally speaking, environmental issues have been addressed much more thoroughly than social ones. Some hardware producers and telecommunication operators can be considered to be pro-active. Companies commonly more directly associated with the term “e-business”, such as *eBay* or *Amazon*, seem to be more reluc-

tant in implementing management tools or making efforts towards sustainability, being environmental or social issues. Their business model is simply the trade of goods, not the production of goods itself. Their number of employees is also quite small in comparison to their revenues and they haven't been in the focus of stakeholder pressure as of now. These facts might be an explanation for their seemingly low interest in the topic. Large retail companies, where e-business is just a supplementary sales channel seem to take a more pro-active role. The following box provides a more detailed insight into some companies initiatives:

Company Initiatives:

*Deutsche Telekom* was traditionally mostly concerned with environmental issues, but has also begun to look at social aspects. Concerning the environment, CO<sub>2</sub> emission reduction is high on the agenda. The company follows this goal via efforts such as energy reduction (eco-efficiency), and a strategy that offers its employees the opportunity to increase the use of electronic telecommunication to replace travel, i.e. telecommunicating job. Waste is a second big issue, DT pushes i.e. the use of electronic bills to minimize paper use. Regarding social aspects, DT internally considers e.g. education and the provision of jobtickets of importance. Externally, the company offers free access for all German schools to the web and follows sponsoring activities (Deutsche Telekom 2003).

*British Telekom* stresses “access” as one of their central issues: “We aim to be at the heart of the information society - in which everyone, irrespective of nationality, culture, ethnicity, class, creed or education, has access to the benefits of information and communications (British Telecom 2003a)”. The company follows several social and environmental actions, summarized under the heading CSR. The company has not implemented an environmental management system, but put a new CSR governance system in place. This brings together the previously separate social and environmental strands of BT. Regarding the environment, it is difficult to identify a focus. Recently, BT signed up for the mayor's green procurement code, which focuses on recycled goods. Socially, the company talks about education, launched a childcare benefit screen and supports Government's UK Online programme (British Telekom 2003b).

*IBM* has committed itself to environmental affairs leadership in all of its business activities. The company runs a program for environmentally conscious products (ECP) which focuses on the entire life cycle of its products, from their design through their end-of-life management. Toxics are an important issue. Regarding social issues, the company focuses on education and its overall goal is to “help people use information technology to improve the quality of life for themselves and others.” IBM also runs some philanthropy projects (IBM 2003).

*Matsushita Electric*, better known as Panasonic, formulated a basic policy towards the environment with an environmental statement, a vision and a plan 2010 with the overall goal to “coexist with the global environment”. The main topics are also product oriented, which means that toxics, energy and resource use are in the focus. The development of sustainable energy sources is also part of this strategy. Social aspects focus mainly on external activities under the heading of Corporate Citizenship. Here education as well as the support of non-profit organisations and philanthropics are of importance (Panasonic 2003).

*Otto*, the worlds mail-order-business leader, engaged in wholesaling and over the counter retail as well, complements its activities increasingly by an e-commerce channel. In 2002 *Otto* was the second largest e-business retailer next to Amazon (*Otto* 2003a). As trader, product procurement is on the agenda, CO<sub>2</sub> emissions which result mainly from transport are also targeted. Besides these external activities, the use of solar energy, the use of rainwater, façade insulation, waste avoidance especially in packaging are internally of importance. Regarding social issues, *Otto* aims at its suppliers. Besides a monitoring system that is installed to makes sure that human rights are abided, education is supported (*Otto* 2003b).

The table below compares the aspects identified in the previous chapter with those found when analysing businesses response to the sustainability debate. Business response include both, the topics taken up by mult-party organisations as

well as by individual businesses. It needs to be stressed, that the aspects have been identified by studying the performance of only a few actors, many of them known to be pro-active.

**Table 3: Comparison of sustainability aspect identified by science and civil society (chapter 1) with those addressed by business.**

Environmental		Social	
Of relevance from science	Addressed by business	Of relevance from science	Addressed by business
Energy	Energy	Technology literacy	Technology literacy
Materials	Materials	Access to information	Access to information
Land use			Access to technology
Transport	Transport	Shift from products to services	
Toxicity	Toxicity	Changing working patterns	Changing working patterns
Waste Electronic Equipment	Waste Electronic Equipment	Creation of a virtual space	
	Emissions	Rise of networks	
	Water	Speed	
		Trust	
		Freedom of expression	Human rights
		Forced labour	
			Empowerment and Education

Comparing the CSR focus areas identified in the previous chapter with the approach and response currently taken, it becomes apparent, that in the environmental domain, business has man-

aged to bring the aspects addressed with those identified by science in agreement to a large extend. A long standing history on environmental protection as well as the fact, that envi-

ronmental aspects are less sector specific than social ones can explain this fact.

In the social dimension the misfit is much larger. Science and civil society have just started to explore the aspects of relevance for the sector and business does not seem to be ahead of the debate. It is essential to emphasise, that addressing an issue does not necessarily mean to address it in an appropriate or efficient way or at the right stages of the products or services life-cycle. Quantity and quality of the responses are in most cases still insufficient to address the large number of aspects identified. Therefore a range of recommendations for business to address the aspects and improve the performance in both dimensions are outlined in the following chapter.

## Recommendations for business

Producing the information and communication infrastructure as well as important applications for an increasingly globalised economy, the ICT and e-business sectors performance draws a lot of attention from various stakeholders. Corporate accountability is thereby increasingly of strategic importance, as highlighted by the examples from the financial market. While this paper concentrates to some extent on the impact side of business, actually the impact prevention can start by devising the right vision and policies. Commitment to general concepts such as CSR is a requirement, but it needs to be operationalised by setting measures and targets, start an organisational learning process etc.. In order to understand their responsibilities and take action to manage their impacts on environment and society, companies shall take part-in stakeholder dialogues and sector-based networks. In this paper, some of the major actors have been mentioned.

Responding to the specific aspects identified above, a fundamental finding derived from the

research is that e-business is not at all purely virtual but strongly linked to the use of natural resources. Key factors influencing the environmental effects of ICTs and e-applications have been identified, among them:

- **Monitoring the environmental impacts of ICT and e-business:**  
The quantification of environmental effects caused by new technologies is still a major challenge. Knowledge about the environmental effects along the entire product chain is a necessary precondition for the identification of efficient improvement options. Cost accounting systems need to be combined with internal material flow data (material flow accounting) not only for internal efficiency gains but also to improve the supply chain communication of the ecological costs of preliminary production and transport.
- **Greening the hardware:**  
Research highlighted the importance of the ICT infrastructure as a major factor for resource consumption of e-applications. The use of secondary materials, the extension of the ICT lifetime and shared usage of equipment are opportunities for resource efficiency. Toxic materials should be phased out wherever possible. Proactive ICT companies should extend warranties and promote the inclusion of environmental considerations already in the design phase (design for environment).
- **Shifting to e-services:**  
E-commerce can – under specific circumstances – provide significant resource efficiency potentials, especially if physical products are shifted to e-services. Businesses should offer e-services as well as request services rather than products from their suppliers wherever possible.
- **Enabling transport efficiencies:**  
Telework and teleconferencing could be used as option by companies to save transport and travel costs. However, these benefits do not occur automatically. Once used on a frequent basis, some standard procedures need to be developed, in order to avoid unintended rebound effects.

- Raising awareness & changing habits:  
Habits and awareness by ICT users are to an increasing extent decisive for the overall material intensity. Efficiency gains might be offset, for example by the re-materialisation of digitised information or the development of additional e-channels without a reduction of traditional ones.

Trying to cover the large number social aspects identified within a few recommendations appears to be an almost impossible mission. Therefore the recommendations outlined below cover only a selected number of aspects

- Recognise and extent the (digital) responsibility:  
Building up a technology literacy in the society and in particular among underprivileged groups appears to be a necessary prerequisite not only to address the issue of trust, but also for a wider penetration of e-business applications. This responsibility goes further than providing an “access to technology”, since it involves enabling people the use the technology to their and societies benefit and to close the gap of the digital divide.
- Acknowledge the technologies limitations and risks:  
Being engaged in building up the capacities for an e-society, business should also be aware of the technologies limitations. While the benefits the technology can bring are not called into question, it might also cause unintended negative impacts to the users. Compromises to the privacy and the risk of overwork are examples.
- Improve sustainability and accountability along supply-chains:  
The increasing complexity of supply-chains in a globalised economy can be addressed by utilising the features modern ICT offers. Transparency and accountability can be raised via communication and information sharing along the supply chain. This includes to build the technological capacities in the business community to efficiently use ICTs and the benefits they can deliver. Issues such as forced labour, links to repression and freedom of expression should be carefully monitored beyond the level of first tier supplier.

## Notes

<sup>1</sup> Digital Europe is a two year pan-European research project into e-business and sustainable development supported by the European Commission, leading companies and European regions. The investigation is conducted by three partners: Wuppertal Institute for Climate, Energy and Environment (Germany), Forum for the Future (UK) and Fondazione Eni Enrico Mattei (Italy). For further information see: [www.digital-eu.org](http://www.digital-eu.org).

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