Chapter 9
Longer Use, Better Use:
How to Avoid Software Induced Hardware Obsolescence

Giovanna Sissa
University of Milan, Italy

ABSTRACT

An effective insight about ICT environmental sustainability requires to pay attention also to the software features, this being another responsible for the CO2 emissions of the ICT sector. The main concerns of green ICT are related to the energy consumption in the computer's use phase, which doesn't depend only on hardware but also on software configuration and from its efficiency. Software is also responsible for the induced hardware obsolescence; the computer lifecycle is shorter than the potential one. A software based approach, as proposed in the chapter, will also allow a longer use for PCs, respecting the environment, saving energy, emissions, and money and, in the meantime, moving toward the cloud computing paradigm. A sustainable balance between innovation, economy, and green aptitude can help to use computers better and longer. Cloud computing, broadband Internet, and thin client are key elements to reach an environmentally sustainable ICT. Environmental benefit starts from a different approach to an old issue, in a re-combination strategy.

INTRODUCTION

Electronic devices which surround our life can be thought as being "clean" technologies. When you turn on a computer, a smart phone or a notebook, you don't see smoke billowing out from anywhere, as with a car or a factory; you can't see, smell, or taste the pollution.

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No subjective feeling is more wrong. Information and communication technologies (ICTs) in the last two decades have been contributing to environmental problems: computers, electronic devices and ICT infrastructure consume significant amounts of electricity, placing a heavy burden on our electric grids and contributing to greenhouse gas emissions. ICT leaves an environmental footprint: the 2% of the global CO2 emission (Gesi, 2008).

Environmental impacts occur during the use of ICTs, but higher environmental impacts often occur before and after the use phase. So environmental impacts need to be considered along the complete life cycle, with important consequences about consumer style and behaviour.

The obsolescence of ICT equipments is a serious and fast increasing problem. In particular computers are getting obsolete more and more quickly, because new operating systems require faster processor, larger memory and powerful hardware.

Lifespans are well below the functional limits of computer. It's the underspending in time that is increasing. Obsolete PCs that are still working could be longer and better used, instead of being disassembled or dumped in landfills causing environmental problem, with a green net benefit and catching a business opportunity.

Internet can play a significant role against the global warming. This role toward sustainability can be played by dematerialization (Hilty,2011), but also reducing the ICT direct contribution to the CO2 emissions, i.e. allowing a more sustainable ICT.

The chapter focus on a potential green chance that cloud computing can represent, also to use computers in a more sustainable way.

The chapter will describe how to extend the effective lifetime of ICT equipment on the basis of a new paradigm, not according to the classical "second hand" style, but rethinking reuse from scratch. All we need is already available. Old PCs and cloud computing can help, in a creative recombining strategy, decreasing e-waste production ratio, avoiding early obsolescence and the wasting of still useful resources in a sustainable perspective.

E-WASTE

In the '90s the "e" prefix, standing for *electronic*, has been put before common nouns, giving them a meaning of new Internet based services: e-government, e-health, e-business, e-learning etc. All those neologisms had a positive meaning. But one day, for the first time, the *e* prefix had been put before a dirty common noun: waste. For the first time the association of the prefix *electronic* to a common noun was not synonymous of potential virtual improvement but of serious physical issue. The "e-waste era" was started.

E-waste is the popular, informal name for electronic products nearing the end of their useful life, like Computers, phones, notebook, monitor, also known as WEEE (Waste Electrical and Electronic Equipment).

It is the rapid growth of computing that is driving e-waste production. In the next five years one billion computers will be retired (Ladou & Lovegrove, 2008). Although the exact amount is unknown, the world's production of e-waste has been estimated at 20-50 million tons per years (UNEP, 2007). E-waste represent the "dark side of the ICT" (Schwarzer, De Bono, Giuliani, Kluser, Peduzzi, 2005).

The increase in turnover is directly linked to the increase in the amount of obsolete equipments, i.e. the volume of e-waste expanding worldwide which needs to be treated.

Manufacturing computers and their various electronic and non-electronic components consumes electricity, raw materials, chemicals, water, and generates hazardous waste (Hilty, 2005). Each PC in use generates about a ton of carbon dioxide every year (Murugesan, 2008). Each stage of a computer's life, from its production, throughout its use, and into its disposal, presents environmental problems. All these directly or indirectly increase carbon dioxide emissions and impact the environment and the trend is increasing in the Business As Usual (Gesi, 2008) scenario.

Changes in technology will affect the global mass of e-waste produced. Short innovation cycles of hardware led to a high turnover of devices. The lifespan of central processing unit dropped from 4-6 years in 1997 to 2 years in 2005. The average