SLOW TECH: TOWARDS GOOD, CLEAN AND FAIR ICT

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Abstract

Slow tech is a new way of looking at technology. It means designing and developing technologies that are 'slow', with the aim of being good, clean, and fair. It has, as an aspiration, the design and use of a new kind of information and communication technologies (ICT): ICT that is human-centred, and that takes into account both the limits of the planet and those of human beings. The focus of this reflection paper is on ICT that speaks to the needs of the environment and society, and is thus implicitly ethical. It contributes towards promoting slow tech to an audience of computer professionals and computer end-users.

Keywords

clean, environmentally sustainable, ethically acceptable, fair, good, information and communication technologies (ICT), slow tech, socially desirable

1. Introduction

Until recently, the concept of limits has been completely peripheral to the information and communication technologies (ICT) world. The free pass that was previously reserved for ICT – and the many aspects of the technology lifecycle – is now beginning to be seriously questioned. ICT is losing its immune status. The long-term sustainability of society, and the widely disparate elements of ICT embedded in today's societal settings, are now being assessed from both their environmental and social viewpoints (Whitehouse et al, 2011).

Human beings have always challenged their own limits. Nevertheless, it is sobering to challenge the concept of planetary limits, as did the Club of Rome (Meadows et al., 1979). It is also vital to consider the limits that may apply in an increasingly technological world to data transfer and conservation; environmental sustainability; human sensory and intellectual 'bandwidth'; and in terms of institutions, organisations and politics (Patrignani & Whitehouse, forthcoming).

This paper examines two areas in which exploring limits is particularly important: the environment and society. It shows in what ways contemporary technologies pose both challenges and opportunities in these two domains. Most concretely, it introduces an approach which it calls slow tech – a parallel with the concept of slow food – that indicates how to position ICT in terms of three important criteria: good, clean, and fair. The paper then explores three case study examples of technology approaches that can be taken to illustrate the slow tech idea. The first describes a sustainable technology that does not damage the environment; the second examines an organisation-wide approach to ICT; and the third introduces a desirable technology that enhances well-being (Green@Hospital, undated; Olivetti, 1959; WSJ, 1965;

Loccioni-Humancare, 2012). The paper goes on to discuss the issue of slow tech in a more analytical way, and to reach a number of conclusions. This final discussion suggests how slow tech as an initiative could be taken further: for example, how it could be applied and implemented in domains populated by computing decision-makers, professionals, and end-users.

2. Slow Tech: An Overview

In 1989, an international grassroots organisation called slow food was founded. Its goal is to "counter the rise of fast food and fast life" (Slow Food International, undated). It concentrates on the concept of food that must be good, clean and fair (in the sense of just or equitable). The slow food movement introduced a process of reflection on the entire food-chain.

Carlo Petrini, founder and main inspirer of the movement, describes slow food as food that must be good (or taste good), and must be a pleasure to eat. Good food is prepared by rediscovering local histories and traditions (such as ancient recipes based on wisdom, that are usually transmitted orally from one generation to another). He suggests that, while people eat, they should reflect on where the food come from. Good food must be selected according to properties of quality. It must be produced following criteria that respect the environment – it must be 'clean' – and it should promote biodiversity and sustainability. Last but not least, the cultivation and production of food must also respect the rights of farmers (it must be fair) (Petrini, 2007; 2011).

Similarly, therefore, we propose a slow tech approach that begins with a reflection on the whole of the ICT value-chain. We suggest applying the same concepts developed in the slow food movement – of good, clean, and fair – to ICT. We call this collection of socially aware and ethical characteristics, slow tech.

We explore, in three sections, the character of good ICT, clean ICT, and fair ICT, starting – in each case – from the meaning of good food, clean food, and fair food.

2.1 Good ICT

Good food is delicious and pleasant. It stimulates the sense of taste and involves all the other senses in a complex and enjoyable experience, extending to the entire body and mind. Can we imagine a similar experience with ICT? Can we transform our interaction with computers into an enjoyable experience?

ICT can be good for human beings when the systems are designed using a human-centred approach. In this case, good means good for us as human beings, and good for our being. Slow tech can enhance the human experience and, at the same time, reduce the human effort to do certain necessary, but sometimes less pleasant, tasks. Human beings have certain characteristics: they forget, they become distracted, and they become old. So, it is important to concentrate more on the complex interaction of the human and the technology. This sophisticated interchange can be an enjoyable experience only if the system and the human-computer interfaces are designed to take human limits into account.

Thus, slow tech implies a search for a new balance between rational thinking and more aesthetic thinking, in which beauty plays a fundamental role. Good ICT means taking into account all the senses of the body, for example, so that it supports people in dealing with diseases or it specifically helps elderly people or people with disabilities.

Good ICT can also help people to find an appropriate balance between working time and free time or leisure, between the time needed for work and obligations, and the time needed for themselves as human beings. Nowadays, there is a risk that ICT is transforming and accelerating people's daily lives, and transforming successive states of 'doing' and 'being' into a single state of only 'doing'. The 'always on' capability provided by ICT involves the danger of having a major impact on people's lives. A 2012 research study on this subject showed that only a small number of organisations has a formal work/life balance policy in place. For example, only 1% of the organisations studied had "days or time when email is not used" such as "e-mail-free Fridays" or "mail-free week ends" (SHRM, 2012).

Good ICT cannot just be the result of a technology push, it must involve users and society in the design stage itself. It needs to be the result of a participatory design[1] approach (CPSR, 1996), and a technology assessment that minimises the risks related to complex software systems (Rogerson and Gotterbarn, 1998; Gotterbarn, 1992).

Good ICT, in summary, means human-centred ICT: technologies that improve human well-being and well-living.

2.2 Clean ICT

Clean food means that neither its production nor its consumption harms the environment, animal welfare, or human health. By extension, clean ICT focuses on avoiding harm to the environment and human health.

Clean ICT means computer systems and networks that are respectful of the planet, and that are designed and produced while taking into account their impact on the environment. In the past, ICT was always accepted since it was perceived as being 'good' by definition.

However, high tech generates toxic hazards throughout its lifecycle (from design, production, consumption to disposal). People are now therefore starting to take into account the entire ICT life-cycle and its environmental impact: from the raw materials involved, to ICT and ICT applications' use, to e-waste management and recycling (Patrignani et al., 2011).

A major environmental impact arises due to the need to power ICT: particularly in the cloud computing era, the energy necessary to power gigantic data centres doubles every five years. The consequent demand for electricity, and a related increase in CO_2 emissions, has a climate change effect around the same level as that of the airline industry (Fettweis and Zimmermann, 2008; European Commission, 2012).

[1] Participatory design is an approach to the assessment, design, and development of technological and organisational systems that places a premium on the active involvement of workplace practitioners (who are usually the potential or current users of the system) in design and decision-making processes.

Clean ICT also means a serious consideration of the destination of the hardware at the end of its life. Despite some advances made due to recent European legislation, at a global level the vast majority of e-waste goes to unknown locations. At its destination, its precise treatment is also unknown. This lack of regulation implies a high risk of eventual environmental pollution, due to the undefined treatment of the hazardous substances such as lead, cadmium, chromium and mercury that the ICT products contain.

For these reasons, since 2006, Greenpeace has been monitoring the ICT industry strictly. However, even the cleanest ICT industry and the most efficient recycling mechanism cannot cope with the growing speed of ICT consumption. This fact explains Greenpeace's final recommendations about extending more generally the lifetime of existing ICT devices, and for consumers to purchase only what they really need (Greenpeace, 2012).

In a way, this is a quest to slow down the ICT life cycle. Clean ICT aims to extend the ICT life cycle by reducing the replacement rate of ICT devices.

2.3 Fair ICT

Fair food implies affordable prices for consumers, and both fair conditions and equitable pay for small-scale food producers. Similarly, fair ICT can be defined as respectful of the human rights, self esteem, and health and safety, of workers in ICT manufacturing and, of course, ICT users.

Fair ICT must take into account the interests of all stakeholders involved throughout the value-chain. From manufacturing, data centre design and recycling, to the creation and execution of software applications, the entire ICT lifecycle needs profound investigation by all the stakeholders involved along the line or throughout the network.

Among the many issues involved in creating fair ICT, to the fore is securing a good quality of working life for all, wherever the workers are located around the globe and whatever their age. Towards the end of 2012, it is now being acknowledged that small improvements may be taking place in, for example, Chinese ICT manufacturing companies. Nevertheless, it is still recognised that profound positive organisational changes may be required for many more decades (Bradsher and Duhigg, 2012).

Fair ICT means open ICT, an ICT that contributes positively to the economy and society through the enabling of its innovation potential. If a product is completely closed (so that no other user else can develop it or program it), then its innovation potential is restricted. Only the corporate owner of the product (or, in many situations, the patent's owner) can take advantage of this closed situation if and when consumers like the product and buy it.

In contrast, innovation in ICT is strongly based on the availability of openly defined layers, through which others can use, adapt and improve the systems and technologies. For example, the openness of the basic protocol of the Internet, TCP/IP,[2] enables anyone to define new applications on top of it (and to develop new physical channels for transporting bits under it). This is one of the most well recognised proofs that an

[2] Transmission control protocol/Internet protocol (TCP/IP) form a set of communication protocols that the Internet uses. it provides end-to-end connectivity.

open definition of standards is the main trigger for innovation and for the generation of social and economic benefits.

One of the most famous examples of open source hardware[3] is the Arduino platform (Arduino, undated). If we seek to apply the same concepts to open software[4], it is then possible to imagine the immense innovation potential of ICT. For example, the current contribution of the open source software to the economy of the European Union has been estimated at €456 billion a year (the direct cost savings of €114 billion in licences, and the indirect cost savings of €342 billion in terms of reduced project failures due to the better quality of open software, lower costs for code maintenance, and increases in productivity and efficiency) (Daffara, 2012; Hillenius, 2012).

Fair ICT can provide a significant contribution to community value by stimulating the creation of local high-tech companies, and organisations that support clients' companies through the development of new business models. These initiatives provide consultancy, and they personalise, customise, and maintain both hardware and software applications.

3. Slow tech: Three case study examples

What, then, does slow tech mean in practice or when applied to the real world?

Three case studies relevant to slow tech can be explored to illustrate this. All three of the case studies aim for good ICT. However, some focus more on the notion of clean, and others on an approach to fair. Generally, the cases use technology to reduce damage to the environment; they concentrate on goodness and fairness; and they develop technology in a way which takes the notion of smartness further. Two of the three cases are associated with health, well-being, and health systems in different parts of Europe.

Other examples from around Europe or the globe could have been proposed instead: indeed, the number of exemplar cases is growing steadily. However, the three examples selected have all been chosen specifically as coming from Italy for two reasons. First, it is the country of origin of slow food, despite the movement's expansion into an international programme over the past 25 years. Second, it is the home of one of the authors, and the examples cited are very familiar to him.

The Green@Hospital case is a version of sustainable technology that does not damage the environment; the Olivetti case refers to an ICT company which – although now an entity within a much larger corporation – had a reputation for its focus on the goodness and fairness of its approach to innovation, and design of products and processes; and the third case, Loccioni-Humancare shows how desirable technology can enhance well-being.

[3] Open source hardware is a recent phenomenon related to hardware design that is open to everyone. It includes the bill of materials, printed and integrated circuits layouts, schematics, and of course the software needed.

[4] "Free and open software" was defined by the Free Software Foundation in 1985 as being related to users' freedom to run, copy, distribute, study, change and improve software (Free Software Foundation, undated).

3.1 Green@Hospital

Among several new large-scale pilots are three that focus on environmental and sustainability concerns – they investigate hospital energy reduction: Green@Hospital (Green@Hospital, undated), Hospilot, and RES Hospitals.

Hospitals are large energy consumers (Ibid, undated). In most European countries, there is a high proportion of ageing building stock (a status that affects the majority of public and private buildings). Hospitals are among the least energy-efficient of the Union's type of public buildings. There is thus an important need to achieve real energy savings from existing hospital building stock. At the same time, when new hospitals are built (as many are), they need to be more sustainable (Ibid, undated).

The Green@Hospital pilot is a particularly interesting initiative that started in spring 2012. It aims to integrate the latest ICT solutions into hospitals for environmental purposes. Its goal is to obtain a significant energy saving in existing hospital buildings through two mechanisms: first, a more effective management of energy resources and, second, a reduction in energy loss. Its challenging overall objective is to achieve a 20% reduction in hospitals' consumption of energy. A Web-based Energy Management and Control Systems (called Web-EMCS) is to be developed:

> "It will integrate, monitor and control multiple buildings systems at the component level. Moreover models to assess the energy savings will be developed and algorithms for consumption optimisation implemented." (Ibid, undated).

The developments are being trialled in four case study hospitals in different European countries. Two are located in the Spanish region of Andalucía, in the cities of Barcelona and Granada; another is based in Chania, Crete; and the fourth is the university hospital of Ancona, Italy. They are to demonstrate the validity of the solution that has been proposed under real-life operating conditions. Each hospital will trial different aspects of the overall plan.

The study acts as a basis for replication of the solutions developed. The potential savings and return on investment identified can, it is anticipated, be taken on board elsewhere. As with all the other large-scale pilots being undertaken, it is hoped that the findings can be repeated eventually on a much wider scale and more comprehensive outcomes.

The study's focus is on the development of ICT, used in place, that can develop a cleaner environment.

3.2 Olivetti

A second, historical, case study is the thinking and work of one of the 20th century's most important Italian industrialists and visionaries: Adriano Olivetti (Ivrea, 1901-1960). Olivetti was able to develop high-tech, innovation, production, profit, solidarity, social responsibility and beauty in a joint enterprise. Some examples of his company's developments include: in 1959, the first mainframe computer based on transistors, the Olivetti ELEA 9003, designed by Ettore Sottsass, one of the most famous designers of last century; in 1965, the first personal computer, the Olivetti P101, designed by the architect Mario Bellini (WSJ, 1965); and, in 1962, the building of the Olivetti Electronic Center, located between Torino and Milano, in Italy,

designed by Le Corbusier (Olivetti, 1959).

Many of Olivetti's ideas were leading forerunners of the notions of good and fair ICT, in buildings and environments that were also good, fair, and beautiful.

3.3 APOTECAchemo by Loccioni

A third, more recent, case-study is called APOTECAchemo.[5]

APOTECAchemo is a robotic application for hospitals developed in 2010 by the Italian company, Loccioni. Developed with the contribution and participation of nurses and clinicians who come from a combination of local hospitals and who gather together in a dedicated forum, it is now used in many hospitals around the world. The robotic arm system prepares very precise pharmaceutical dosages needed for cancer treatment. It produces careful and exact weightings of all the chemical ingredients necessary to treat severely ill patients, and it manipulates the substances in a way that ensures a high level of safety for all the people involved in the process:

> "... The manual preparation of cytotoxic drugs has a high possibility of dosage errors with serious consequences for the patient and high professional risks for those who remain exposed to carcinogens of cytotoxic drugs. Patients are protected by humancare high-tech solutions that recognize the active ingredients ... The tracking system of all phases, based on a barcode, allows a perfect integration between the department and the oncological pharmacy service ..." (Loccioni-Humancare, 2012).

APOTECAchemo is an ICT solution, based on an integrated approach, that places the patient right in the centre of the hospital workflow. Thus, it reduces the costs of customised therapies, validates them, and makes health systems more efficient, sustainable, and human (Ibid, 2012). Such well-being is a concept that is likely to come to the fore in the next phase of the information society.

APOTECAchemo is very close to the concept of slow tech. It is good, clean, and fair. It is good because it has been designed with the goal of ensuring the safety of patients and nurses. Participatory design was fundamental to its development: a community of patients, nurses and hospital professionals is continuously collaborating to monitor and improve the solution. It is clean: the Loccioni company is a famous example of a joint approach to innovation and environmental care. In 2010, the company received the National Innovation Award from the President of Italian Republic and the National Enterprise-Environment Award from the environmental association, Legambiente. It is also fair, since Loccioni has defined and demonstrated a strong sense of corporate social responsibility that puts people always at the centre of its strategies and activities.

4. Discussion and conclusions

Human beings, and the planet itself, are finding it difficult to cope with the accelerating speed of ICT, and the tempo of its accompanying, fast-moving, clock. Thus, this paper focuses on a need for slow tech, that is, on ICT that is good, clean,

[5] The word APOTECA is extracted from the Latin or Ancient Greek for a storehouse, which is now used with the meaning of a pharmacy.

and fair. It integrates the justification, background, analysis, analogies, and examples needed for this new approach to technology.

Slow tech is put forward as a means of re-thinking the pace of development of ICT that, until now, has been celebrated because it has been getting faster and more powerful (stronger) every year. The future could mean an environment in which it would be possible to work with pleasure and a more profound sense of life; where ICT could support individuals and society through many ways of working, and acting collectively and collaboratively; and yet in which ICT can remain as a companion throughout people's lives.

Slow tech certainly implies a critique of much of the status quo in which many of the current challenges described, conditions and directions taken, are seen as unavoidable. It is proposed, not so much as a single solution, but as an invitation to initiate a reflection around current ICT values and uses. It is a call to work together on combining the environmental, with the social and the ethical, in a more considered and reflective way. These three dimensions of good, clean and fair can be worn like a new pair of glasses, as a new way of seeing.

Slow tech could eventually permit a kind of return to a more leisurely pace. It is a humble proposal for a new direction to take. It provides a form of compass or tool or instrument that can help to identify new or alternative futures.

While slow tech could be used to develop a standard or a brand to be adopted in the future, it should certainly not be seen as a pure, formal checklist of items to be ticked off a list of achievements.

This journey or quest could also, ultimately, be expanded intellectually to include a further six dimensions, adopted from two separate authors (Langer, 1996; Von Schomberg, 2012). Attention needs certainly to be paid to the concepts of slower, deeper, and sweeter (Ibid, 1996) and socially desirable, environmentally sustainable, and ethically acceptable ICT (Ibid, 2012).

Purely as examples of how the slow tech idea could be adapted more precisely, two proposals follow. For educational policy-makers, including universities, slow tech could be used to expand the curricula to encourage computer science and engineering students to focus on these three dimensions of good, clean, and fair. Similarly, professional computing organisations or associations could enhance their general codes of conduct and professional guidelines to include the same three dimensions, with the dual intention of affecting their own members' behaviour as well as promoting a message to be sent out to a wider community of computing professionals and computer end-users.

These insights into the slow tech approach are, ultimately, offered as a possible opening of a dialogue which – to paraphrase a commentator in this field – can be seen as being around a route to general awareness and acceptance of "the brakes required in the technological Indianapolis"[6].

[6] Indianapolis, the state capital of the American state of Indiana, is home to a large number of sports and entertainment events, many connected with high-speed motor racing.

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