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Managing the green IT agenda

Patrizia Lombardi*

City & Housing Department, Politecnico di Torino, C.so M.D'Azeglio 42, 10125 Turin, Italy

Green IT is a new emerging field of study that brings together both environmental sustainability and information technology (IT) and explores the ways in which they connect with each other. This article aims to challenge the proposition provided by Bill Tomlinson (2010) that the currently developing relation between environmental sustainability and IT is a promising one with reference to a number of critical issues, including environmental sustainability, environmental technology, green IT challenges and a green IT agenda.

Keywords: environmental sustainability; green IT; e-governance

ENVIRONMENTAL SUSTAINABILITY

Sustainability is certainly one of the greatest and most challenging paradigms faced by humans. The concept dates back more than 40 years and was explicitly coined to suggest that it was possible to achieve economic growth and industrialization without environmental damage. Over these four decades, the definition of sustainable development has evolved, and currently at the core of conventional sustainability thinking are the three 'pillars' of environmental, social and economic sustainability.

During this period, governments, communities and businesses have tried to respond to the challenge of sustainability, and innumerable conferences and summits have produced declarations, agendas and strategies. Despite all these efforts, a recent four-year global study into the state of global ecosystem services and the possible consequences of anticipated ecosystem change on human well-being has found that 'the results of human activity are [still] putting such a strain on the natural functions of Earth that the ability of the planet's ecosystems to sustain future generations can no longer be taken for granted'

(Millennium Ecosystem Assessment, 2005, p.2). This warning is also shared by many other international environmental agencies and official reports, including the Intergovernmental Panel on Climate Change (IPCC, 2007) and the United Nations Environment Programme (UNEP, 2008). The latter found that nearly two-thirds of the essential services provided by nature to humankind are in decline worldwide, and in many cases we are literally living on borrowed time. Why?

In *Greening through IT*, Tomlinson provides an important reason for the decline: 'The key problem in the way humans understand and act on environmental issues is one of scale' (p.5). According to Tomlinson, 'environmental issues operate on "broad" scales of time, space, and complexity compared to the typical "narrow" scope of human concerns'. The thesis offered by Tomlinson is that green IT can help people live more sustainable lives 'by enabling innovations in infrastructures, education, personal change, community involvement, and many other domains' (p.26).

There are numerous other reasons cited by critics, such as weak political will, conflict

*E-mail: patrizia.lombardi@polito.it

between the growth imperative and the notion of limits on consumption, failure to communicate the reality and urgency of the problem, individual self-interest, etc.

In his article 'The Future of Sustainability' in the Report of the IUCN Renowned Thinkers Meeting in January 2006, W. M. Adams listed some major reasons: the elasticity of the concept, it is holistic, attractive, elastic but imprecise; the 'three pillars model' implying falsely that trade-offs are always possible between the different dimensions; and the problem of metrics as a result of the desire to set targets and measure progress, although there is no agreed way of defining the extent to which sustainability is being achieved in any policy programme. Therefore, an urgent need is to devise 'new' metrics that arise from a consensus about aims and means. These should be able to make the economy 'tell the economic truth' about the externalities of technological and socio-economic processes.

INFORMATION TECHNOLOGY

Information (and communication) technologies (ITs) loom large in international policies for sustainability development. Much depends on their assumed capacity to generate and maintain more sustainable patterns of living and working. Moreover, ITs are expected to deliver this transformation across multiple territorial scales, global, national, regional, urban, community and individual workplaces. Given the breadth and depth of these ambitions, it is difficult to exaggerate the importance of successful exploitation of ITs to the delivery of sustainable development (Lombardi et al., 2009).

A major question that arises is: *Are ITs effectively supporting the process of achieving sustainable development?*

The answer provided by Tomlinson in *Greening through IT* is extremely optimistic and positive. The central argument is that:

- 'Unassisted, humans are not well equipped to deal with problems on the scales of time, space and complexity'.

- Throughout history, technological innovations have enabled human cultures to deal with broader suites of problems than we would otherwise be able to address.
- IT specifically involves tools and techniques for dealing with vast bodies of information across wide range[s] of time, space, and complexity, and is thus well suited for addressing environmental concerns. (p.26)

The survey of IT innovations presented in the book to support the author's argumentation includes three social green IT projects created by Tomlinson's research group, entitled EcoRaft, Trackulous and GreenScanner. The three projects are analysed to examine how they are able to contribute to the lengthening of people's time and space horizons for understanding the complexity surrounding environmental issues and take appropriate actions. In particular,

'EcoRaft is an interactive museum exhibit designed to help children learn principles of restoration ecology. Trackulous is a suite of Web-based tools that assist people in tracking, analyzing and sharing information about their own environmental impact and other personal data. GreenScanner is a system designed for desktops and mobile devices to help people engage in environmentally preferable purchasing by accessing community-generated environmental impact reviews about consumer products. (p.23)

Although these projects are interesting and pioneering examples of the diverse ways in which IT is able to impact environmental issues, they all operate at the individual level, focusing on personal green IT. Surprisingly, in the entire book, there is no mention of the essential and challenging role played by institutions, such as central and local governments, industries and universities (i.e. the 'triple-helix' thesis of innovation according to Etzkowitz and

Leydesdorff, 2000), in managing the transition toward new technologies.

There are several and different levels of decision-making, related to policy and implementation, from individual and household to community, city, region, national and global (Brandon and Lombardi, 2005, p.166). Although we need to act at all levels, a useful focus could well be the city and its environs. In fact the 'city' is at the pivotal point between policy and implementation as it both makes and implements policy. This would combine policy with action and is likely to have the greatest impact.

GREEN IT CHALLENGES

There is an implicit assumption in the current debate on green IT, which is reflected in a number of significant policies and strategies put forward for achieving sustainability, including the European Lisbon Strategy (CEC, 2000) and the consequent i2010 strategy, that the implied 'soft transformation' from resource-intensive traditional industries towards much more resource efficient knowledge and service industries of a dynamic information society will contribute to achieving more sustainable development. This assumption has not been proved yet and new metrics are needed to measure progress, that is, to establish the contribution that ITs are making to overall economic and social progress as well as to environmental improvements (Lombardi et al., 2010).

Particularly evident is the problem in the recent SmartCities debate where the absence of any commonly agreed terminology to describe IT-driven innovations and developments has left the community without the vocabulary to discuss such matters and agree upon what they mean, as Torres et al. argue in an article in *Government Information Quarterly* in 2005. In 'The IntelCities Community of Practice', 2009, Deakin indicates that this debate has been hampered, not so much with the need to agree on a standard representation of e-service developments, but by the lack of a robust

statistical base to measure them. For instance, it is often claimed that some cities are smart in the way they use ITs to develop e-services. Claims made about their use of ITs to innovate and develop e-services testify to this. Recent surveys of these developments, however, also serve to raise a number of questions about whether such IT-driven innovations are smart and whether cities should be creating opportunities for online services offering 24/7 access.

Effectively addressing Green IT challenges in cities requires advancing the principles of 'good governance' in e-government where participation in decision-making is key to democratic urban governing. This is especially the case in cities because competitiveness and sustainable development interface with politics and governance in a complex and active arena of policy change and action. In this both public administrators and regular citizens have a stake. For these potential benefits to be achieved, it is evident that there are many 'front of house' and 'back office' changes that cities need to put in place. For example, it has been recognized that public managers must shift from the 'producer' and 'cost-efficiency' concerns to a focus on 'user satisfaction' and 'control', 'flexibility in service delivery' and 'network management', as pointed out by Paskaleva-Shapira in an article in *International Journal of Electronic Governance Research* in 2008.

These changes are not trivial because without them well-intentioned approaches taken by urban governments to deploy ITs are unlikely to succeed. Cities need to demonstrate that they are both willing and able to deliver the e-Governance and e-Participation agenda if they want to persuade their citizens to embrace the opportunities presented by the move towards e-Democracy (Lombardi et al., 2010).

Lessons are still to be learnt about the implications for public administrations of the transformation from representative to participatory democracy in policy and the role of citizens in local decision-making using digital technologies. However, there is a great contrast between the current silence and opportunities

of integrated sustainability in local digital government and the way in which ITs are actually changing the role and responsibilities of public administration in Information and Knowledge Society; this contrast needs to be overcome (Lombardi et al., 2009, p.474).

A GREEN IT AGENDA

So what are the trends in IT that may have an impact on sustainable development? In 2005 Brandon and Lombardi (pp.163–5) summarized them as:

- *Convergence*: At one level the technologies themselves are converging together through digital processes so that they can interact in a way that has not happened before. The second is convergence of content.
- *Connectivity*: We are moving towards 'knowledge grids' where computers act together and become more powerful and their knowledge more accessible.
- *Culture*: As technology becomes more user-friendly and education on how to use it becomes more widespread, the patterns of behaviour among human beings will adapt to the new environment.
- *Creativity*: For many years computers have been seen as machines that constrain creativity. This is changing, and increasingly, as the technology mimics the real world and the degrees of freedom we experience in the real world become available in the virtual environment.
- *Content*: It is the content of the knowledge networks that is critical to their take-up and the way they are used, and what actions follow from this increase in knowledge. The knowledge has the power to bind people together. On the other hand, it has the power to divide and reinforce prejudice.
- *Collaborative working*: There is a development in collaborative working across normal geographic boundaries.

In *Greening through IT*, Tomlinson handles most of the above issues when he discusses the role

of technology in dealing with environmental sustainability and when he presents the survey of IT innovations. For instance, he argues that global standards are one of the main features of IT, 'with computers around the world agreeing about TCP/IP and other formats for exchanging digital information' (p.78). This is an issue of *convergence* and a powerful characteristic that makes IT particularly well suited to sustainability issues. Furthermore, 'IT can connect experts to each other, enabling them to exchange data and integrate their ideas, and involve laypeople in many stages of the process, helping them commit to the lifestyle transformations that will be necessary' (p.89), which is a matter of both *connectivity* and *collaborative work*. An excellent example is provided by the new class of network-based computing that takes place over the Internet, so-called 'cloud computing'. As well explained by Mark Baker of the University of Reading, *cloud computing* enables companies and applications, which are system infrastructure dependent, to be infrastructure-less. Using the Internet for communication and transport provides hardware, software and networking services to clients. In addition, it hides the complexity and details of the underlying infrastructure from users and applications by providing a very simple graphical interface (Baker, 2010).

In conclusion, if we wish to have an IT that will help sustainable development, what aspects should we be encouraging and implementing?

What is clear from all of the above examples and discussion is that a green IT agenda is required, which should be agreed upon between all decision-makers, including governments, local authorities, educational and research institutions, financial organizations, business companies and civil society organizations, as well as single individuals.

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