BOOKS & ARTS

Sustainability through computing

A book promoting the use of informatics to help us live greener lives could have been enhanced by following interactive design principles, suggests **Nick Salafsky**.

Greening Through IT: Information Technology for Environmental Sustainability
by Bill Tomlinson
MIT Press: 2010. 216 pp. $24.95

Most environmental problems occur at spatial, temporal and complexity scales beyond those that individuals are able to grasp, let alone address. Bill Tomlinson argues in *Greening Through IT* that information technology (IT) provides a path to sustainability by allowing us to manage information collectively on appropriate scales.

Tomlinson, a professor of informatics, advocates designing IT systems to meet the needs of both humans and our environment. His proposal extends the principle that successful IT systems should meet the specific needs of specific users. One of the many examples he cites is the development of smart electricity and gas meters that support real-time pricing, enabling households to optimize energy use and utility companies to develop more-efficient power networks. Others include electronic communication networks that replace the need to travel to meetings, and online mapping systems that enable scientists and the public to chart the effects of wide-scale environmental change, such as rising sea levels. He offers interesting facts about resources, such as that the collective time spent by Americans watching television adverts in one weekend is equivalent to the hours of work required to create Wikipedia, and that a Second Life avatar consumes energy at a rate comparable to that of a real-world Brazilian person.

Tomlinson covers many topics. But in choosing to address a wide audience rather than focusing on either students or professionals, he ignores his own design principle and meets the needs of neither group. His discussions of human impacts on our planet, of socio-economic systems and of the role of technology in society might provide useful context for computer-science undergraduates, but are too simplistic for advanced readers. Yet it is hard to imagine any college student steeped in social networking being inspired by the somewhat stale case studies on which the book centres.

AFP/GETTY

An avatar consumes energy at a level comparable to a person in Brazil.

Three emerging ideas in IT point towards Tomlinson's vision of using technology to solve environmental problems, yet are neglected in his account. The first is the development of iterative 'agile' programming methods, which are better suited to meeting complex and uncertain user needs than the traditional, sequential 'waterfall' method of designing, writing, testing and debugging code. The agile process is responsive and modular: to address user-defined problems, small modules of working code are developed and tested with users to get feedback on both the existing code and the users' future needs. Agile development is particularly useful when designing systems in which problems must be framed appropriately before they can be solved. For example, in my own work to develop software for managing biodiversity conservation projects, our design team worked with users to develop a new form of work-planning chart that was more suited to the specialized needs of non-profit organizations than the more rigid form typically used by engineers and builders.

The agile process is analogous to the adaptive management approaches being developed by conservation organizations to tackle complex environmental problems, such as combating the global bushmeat trade or integrating conservation and human socio-economic needs into the management of large ecosystems. In my experience, agile development both produces better technology and provides a powerful model for managing complexity and uncertainty.

The second trend is the development of open-source licensing agreements for software programs and open-content approaches to data ownership, such as the one used by Wikipedia. Tomlinson's vision is ultimately limited not by the technical problem of enabling individuals to share environmental information, but by the behavioural problem of providing incentives for people to do so. The development of open-source licensing arrangements that allow large numbers of people to share and build on each other's work, the creation of common standards to handle this information and the adoption of incentives to promote their use are innovations that make collaboration possible on a global scale. Just as evidence-based medicine depends on having open access to the clinical-trial results of various therapies, evidence-based conservation depends on practitioners sharing results about the conditions under which different interventions either worked or failed.

The third development is the growing research into how collective organisms share information and make decisions. Although Tomlinson does discuss how green IT might lead to collective action, he might have drawn more on the expanding literature about the wisdom of crowds; how ant colonies collectively 'know' more than their individual members; and how social-marketing tools might be developed to promote behavioural change through viral spread.

I strongly agree with Tomlinson that IT provides a path to sustainability by allowing humanity to manage the large and complex problems it faces. Yet I wish he had followed his own design principle more closely. Instead of a copyrighted textbook, he could have worked iteratively with his students to create an open-source website on which a community of practitioners could post their experiences and be inspired to build on the findings of others. Such a site would have been a fitting contribution to the sustainable future that Tomlinson envisions. ■

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