

SIGCHI Workshop Position Paper: Sustainable Practitioners in HCI

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ABSTRACT

This paper presents the notion of a sustainable practitioner as a model for sustainable interaction design. This model has been applied to all disciplines at Otago Polytechnic and to Computing Education in New Zealand (and increasingly internationally).

Author Keywords

Management, Economics, Reliability, Human Factors, Sustainability, Practitioner

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

K7.4 [The Computing Profession]: Professional Ethics

INTRODUCTION

I come to this workshop as a researcher and teacher in Interaction Design; as a researcher in wider Computing Education; and as a research and advocate in Sustainability. I bring these three things together to talk about the notion of the sustainable practitioner in HCI.

Our desire to be at the forefront of technology and development comes not only with the kudos of being the enabling science but also carries the responsibility for its social and environmental impacts. Technology quickens and facilitates the way humans shape the world. Whether we look at our environmental, social, cultural or ecological records, aspects of that shape are alarming. Recognition of human created problems such as poverty, pollution, species annihilation, change of the very ecosystem that supports us and now even scarcity of food to feed ourselves is becoming general knowledge.

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We are well placed to bring awareness and ignite proactive approaches amongst our sector. By doing so, we entrench an awareness of environmental and social issues into nearly every component of new technology and development. That this technology underpins the sustainable development of the wider community cannot be overstated.

To do this, we need to think and act as sustainable practitioners. Therefore, we need to understand the concepts of social, environmental and economic sustainability in order to evaluate, question and discuss our role in the world to enable us to make changes where and when appropriate. In other words: what does it mean to be a sustainable practitioner? – in computing in general and in HCI in particular?

Of particular interest is in how we get practices, strategies or policy implemented into industry, government and education sectors that will actually enhance the environment (not merely have “less” impact) and promote equity and fairness across the global society.

My background is in applying participatory design to sustainable decision making on a regional scale. In current research, SimPä, my collaborators and I are working with Māori communities to retell their stories in 3D game format (teaching Māori kids new media and programming in the process!) [6]. This approach is also the basis for our development of Education for Sustainability in our institution, nationally (New Zealand), and increasingly internationally. This participatory development model may apply equally well to the development of sustainable models of HCI.

Institution

I first present the (ongoing) experience of the integration of sustainability across an entire institution. Otago Polytechnic has an educational goal that “every graduate may think and act as a sustainable practitioner” (by the second half of 2009). This goal is clearly aimed at teaching practice that which focuses on contributing to a better community, at producing graduates across the institution with relevant skills and values (to both think and act – action competence [4,5], and about working closely with industry to both identify and achieve sustainable practice in each discipline.

This initiative was based on the goal of incorporating education for sustainability across all disciplines and programmes as an integrated core competency for all education outcomes. The core capability places sustainability at the same level as other generic competencies: literacy, numeracy etc. (or, as we are fond of describing: “reading, writing and sustainability”). The model is referred to as an “every graduate” approach. [9].

All disciplines at Otago Polytechnic – including Design and Information Technology – are working towards this goal with varying models of transformation and integration. The Polytechnic is undertaking a range of initiatives that are discipline based and cross-discipline, top-down and bottom-up. An agenda has been agreed by every department, starting with the notion of the “sustainable practitioner”. The work of each discipline is complemented by multi discipline and systemic initiatives. These include: curriculum developments; a transformation of the institution to a “LivingCampus”; a benchmarking study of all incoming students [13 based on 2, 3]; integration into academic quality processes; staff development programmes; research focus incentives; and support for student led initiatives.

The concept of the sustainable practitioner is fundamental to our approach. Each discipline is coming to terms with what it means to be a sustainable practitioner. These are expressed as a statement starting “A *sustainable practitioner in <discipline> is someone who....*”. This is accompanied by some short narratives that describe desired behaviours. The focus here is not on specific practice, but on a backcasting approach: “imagine a sustainable future (in 10, 20, 50 years), what is your <disciplines’> contribution to that sustainable future?”

In describing these behaviours we are trying to go beyond the trivial, the things that every worker should do (recycling office paper, walking up stairs etc) and get to the difficult questions. This is perhaps akin to Blevis’ lens [1].

We characterised this by asking departments to consider their equivalent to this story: a forestry worker attending a hypothetical entry level skills chainsaw maintenance course. As part of that course the future chainsaw operators are taught all about being careful when changing the chainsaw oil, not spilling it and collecting it for recycling. We could certify the graduates as “sustainable”. What is going to matter, perhaps more so, is what our graduate does on the first day when, after a morning of carefully changing oil, he is roundly abused – ‘just chuck it in the stream, you’re holding up the whole gang’. And what do we expect our graduate to do when on the first day on the job our graduate is told to go and chop down the last Kauri (an NZ native tree). The answer isn’t as simple as saying no (he’ll get fired and someone else will chop it down), nor is as simple as saying ‘yes’ (surely unsustainable). Nor is the answer that we’d teach integrated catchment management – such material is perhaps considerably outside the scope of

our chainsaw operator. Instead the answer is something about polite questioning and discussing alternatives. The problem can be further extended by considering that most problems are not of the “last Kauri tree” variety, rather, the 999th Kauri tree (ie a tragedy of the commons problem). Recognising the significance of the tree is also something not going to happen by accident.

Given this scenario, which readily translates to other disciplines, each department has worked with its stakeholders to identify behaviours expected of their own graduates.

This scenario was used as part of a survey of incoming students across the entire institution. Incoming IT students were particularly strident that they would follow instructions even if a task is unsustainable. This seems at odds with the characterisation of our students as independently thinking creative geeks. Instead, a substantial number of them suggest they would do an unsustainable task on basis of disempowerment with a power relationship. Fortunately, a reassuring 50% would at least talk about it [11].

The sustainable practitioner easily translates into graduate profiles, learning outcomes, objectives and assessments. Sustainability is about context and big pictures (systems thinking, ethics, evaluating change, scientific and creative paradigms) and a few methodologies (eg carbon footprinting as appropriate). The participatory process of articulating the sustainable practitioner for each department has meant that very few people indeed have said “but I’m a <discipliner> this has nothing to do with me”. The response has been the opposite with a surge of sustainability related research.

National and International

For computing, we worked with the New Zealand computing organization (NACCQ) who adopted a policy that states: *Computing and IT underpins every sector of society as a pervasive and influential discipline with global impact...our vision is that our graduates, our practitioners and our academics understand the concepts of social, environmental and economic sustainability in order for them to evaluate, question and discuss their role in the world and to enable them to make changes where and when appropriate.*

The crucial bit is at the start: the underpinning. This positions computing as a facilitator of wider sustainable change, computing can have a far bigger impact than its own footprint [7].

This policy statement is now the basis for much of NZ’s computing curricula [12]. Internationally, a working group at ITiCSE [10] formulated and proposed the following statement for adoption first by SIGCSE, and (we hope) eventually the ACM:

Computing and IT underpins every sector of society as a pervasive and influential discipline with global impact. As a result, computing influences the environment and society either positively or negatively. While we have seen positive benefit from incremental changes such as reductions in energy usage and recycling components, more comprehensive and transformative changes are needed to meet contemporary challenges. Therefore, our vision is that our graduates, practitioners and academics understand the concepts of social, environmental and economic sustainability in order for them to evaluate, question and discuss their role in the world and to enable them to make changes where and when appropriate. Our goal is that every graduate think and act as a “sustainable practitioner”. This way computing will be a driving influence in the creation of a sustainable future in every sector it touches.

Moreover, computing educators must take a lead in sustainability so that computing practitioners can be encouraged and supported to promote sustainable practice in every sector where computing plays a role. This can primarily be achieved by the fostering of sustainability as a core value of computing education.

Creating a philosophy of Computer Education for Sustainability will be enhanced if undertaken within a context of institutional operational practice. We will then be seen to be modeling good practice.

Agenda

Following on this draft policy statement on computing education for sustainability, the Working Group developed an agenda for achieving this vision. It is intended as empowering and engaging. It is deliberately both top down and bottom up. It is deliberately both incremental and transformative. It is deliberately aimed at the champions and the ordinary practitioner/research/teacher. It deliberately challenges (without pushing anything “down my throat”) and provides resources to encourage. It provides for an engagement with industry, community and students.

1. Work with the wider ACM community to envisage and articulate a role for computing and computing practitioners for a sustainable future.
2. Work with the wider ACM computing community to articulate a discipline response to sustainability. This may take the form of mission statements (etc) from professional societies.
3. Work with the wider ACM computing community to identify expected behaviours for computing practitioners for sustainability challenges.
4. Develop an understanding of the current status of sustainability (values, awareness, knowledge, skills & behaviours) of all our stakeholders (students, intake, stakeholders, staff, graduates, professional/trade

connections). (IT and Design second only to Business in lowest reported desire to contribute to improving environment/community. IT students anthropocentric beliefs include that the balance of nature is strong enough to cope with impacts, that humans will work out how to control nature, that the ecological crisis has been exaggerated, that humans are meant to rule over nature [11]).

5. Identify sustainability statements for graduate outcomes and core competencies for computer practitioners. This should be both incremental and transformative.
6. Develop learning outcomes that can be integrated into courses looking simultaneously at course specific issues and holistic approaches.
7. Identify and promote exemplar resources and teaching strategies, initially identifying sustainability related areas missing from current curricula. (this is a focus of the upcoming ITiCSE Working Group <http://iticse09.lrde.org/wg/3/>).
8. Assess lecturer expertise and skill requirements in computing for sustainability and establish a development plan for the computing education sector.(see survey of educators [10]).
9. Integrate sustainability into quality assurance processes (curriculum documents, moderation and monitoring checklists etc).
10. Frame “for sustainability” as a core driver for research. This means research aimed at increasing the sustainability of computing (own footprint), and promoting computing for sustainability (facilitation role). Both of these will require a wider interdisciplinary approach to computing research [8].
11. Establish a network of sustainability champions to promote Computing for Sustainability (CfS) and Computer Education for Sustainability (CEfS) as legitimate and mainstream areas of computing.
12. Undertake community, national, international scale activities to raise the awareness of sustainability in computing.

CONCLUSION

The sustainable practitioner approach provides a generic model for the exploration of sustainable practices in any discipline. We have applied it effectively to both IT and Design. I believe it will provide a mechanism for the development of measures of success in sustainable interaction design.

REFERENCES

1. Blevins, E. (2007). Sustainable Interaction Design: Invention and disposal, renewal and reuse. *Conference on Human Factors in Computing Systems*, San Jose, California, ACM. 503 - 512

2. Dunlap, R., Van Liere, K., Mertig, A., & Jones, R. (2000). New Trends in Measuring Environmental Attitudes: Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. *Journal of Social Issues*, 56(3), 425-442.
3. Fien, J., Yenken, D. and Sykes, H. (Eds)(2002) *Young People and the Environment: An Asia-Pacific Perspective*, Kluwer Academic Publishers: Dordrecht.
4. Jensen, B.B. & Nielsen, K. (2003) "Action-oriented environmental education: Clarifying the concept of action" *Journal of Environmental Education Research* 1:173-193
5. Jensen, B. B. and Schnack, K. (1997). "The action competence approach in environmental education." *Environmental Education Research* 3(2): 163-179.
6. Mann, S., Russell, K., Camp, J., Crook, M., & Wikaira, J. (2006). Maori Game Design. Paper presented at the 19th Annual Conference of the National Advisory Committee on Computing Qualifications, Wellington, New Zealand. 165-173
7. Mann, S., & Smith, L. (2007, 7th-10th July 2006). Computing Education for Sustainability. Paper presented at the 20th Annual Conference of the National Advisory Committee on Computing Qualifications, Nelson, New Zealand.
8. Mann, S. , Smith, L.G. (2008) Biomimicry as a super systems metaphor for software engineering? Supplementary Proceedings of the 21st NACCQ. 287-296
9. Mann, S. and L. Smith (2008). Every Graduate Education for Sustainability one year on. Invited Paper at the 21st Annual Conference of the National Advisory Committee on Computing Qualifications. 155-164
10. Mann, S., Smith, L., & Muller, L. (2008). Computing education for sustainability. *SIGCSE Bull.*, 40(4), 183-193.
11. Mann, S., Smith, L., Shephard, K., Smith, N., & Deaker, L. (in prep). Benchmarking sustainability values of incoming computing students.
12. National Advisory Committee on Computing Qualifications, retrieved 26/03/09 from <http://naccq.ac.nz/qualifications.html>
13. Shephard K, Smith N and Mann S (2008) Answering the Call: Otago Polytechnic's role in creating sustainable practitioners 31st Annual HERDSA Conference Rotorua, New Zealand.