New media solutions for sustainability: a GRAND challenge proposal

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Preamble

At this stage of the GRAND renewal process the call has gone out for project and sub-project LOIs that fall under one or more of the identified GRAND challenges. This, however, is not a project proposal. It is an overarching, as yet incomplete, concept for a set of project areas that together represent what we believe are critical opportunities for new media researchers to positively impact the intersection of technology, climate science, design, development and social needs in the move towards more sustainable living and working in the built environment around us.

Why tender an overall theme proposal? There are two compelling reasons. First, the topic of sustainability in general, and the role that new media, interactive computing, machine learning, and information systems can play in it, is enormous. By targeting the direction even a little bit, we can identify more coherent plans for interaction with the receptor communities to whom this research is important. The focus on resource conservation particularly in the built environment is an emerging area of critical importance in sustainability initiatives and policy in BC and Canada–wide. The three general areas suggested for the theme were informed by substantive research in the sustainability discourse across different disciplines and derived from extensive experience and consultation with different receptor communities: public utilities, energy analysts, municipal governments, climate scientists, policy analysts, planners, educators, social scientists, building industries and design professionals..
Second, following the GRAND philosophy of interdisciplinary mashups, a coherent theme structure facilitates commonality and cross-pollination opportunities among projects and, by extension, among researchers and receptors they might not have previously known.

There are three project areas proposed for this theme, and they comprise a number of subprojects drawn from current and potential GRAND researchers. Not all the projects are complete or fully formed; the next critical steps are to ensure the right leaders and participants. But they do represent the first effort at characterising the shape of what we think forms a rich, promising and challenging design and research space for the next cycle of GRAND. These three project descriptions are included with this theme overview as an integrated proposal.

Finally, there is a strong likelihood that GRAND can partner with the Pacific Institute for Climate Solutions (set up with a $100M endowment from the Province of British Columbia) in practical research, networking and partnerships, and knowledge and technology exchange and exploitation. The partnership would most likely take a form similar to the old NSERC/Canada Council program in which PICS funds the climate aspects of a project and GRAND funds the new media aspects. We have approval in principle from the PICS Director Tom Pedersen to bring this possibility to the GRAND RMC. Likely amount are in the low to mid $100Ks per year.

Overview

Positively affecting climate change involves policy, social change, human behaviour and technology. All of these involve systems - social, technological, manufactured and regulatory - that serve and are used by people. The increasing pervasiveness of digital media and accessible information systems in all aspects of life offers the potential to create, enhance, and implement human-centred solutions to sustainability. Interactive computing, mobile applications, gaming, ubiquitous information, social networks and all forms of digital media are all important components of sustainability strategies advocated by resource providers, utilities, governments, community groups and activists. However, the current approaches of just delivering more information on more platforms is not proving effective in delivering outcomes that contribute to conservation and sustainable behaviour.

How people perceive, use and control the tools and applications that comprise an information system determines much of its usefulness and performance. Understanding the scope to which these new media forms can help deliver solutions that support sustainable living involves understanding motivations and impediments to human behaviour; how how humans interact with media and technology; what comprises the appropriate design and deployment of these information approaches; and where new media and digital systems can best be targeted - in essence, to determine how sustainability requirements and issues can be best addressed by digital media interventions and enhancements. This requires an interdisciplinary approach that brings together researchers in digital media, information systems, interactive computing, and human behaviour with domain experts in climate change and stakeholders in government, utilities and industry.

The built environment is of particular interest for several reasons. Buildings produce a large percentage (48%) of GHGs. There is a wide variety and age of building stock. They comprise a large and complex technological system on different scales, from the individual home to the larger collective. Finally, how humans interact with the built environment, particularly around more sustainable practices and use, is only now emerging as an important area of research into improving how buildings perform.

Reducing emissions from buildings involves more informed and more engaged human interaction on a number of fronts. We see three main areas in which new media researchers can play a role: social practice and motivation, interactive systems for energy use management, particularly at the residential scale, and tools and methods for policy makers, planners and designers (architects and developers) that bring human motivation and occupant behavior into the design space. We briefly discuss each in turn, with an emphasis on the opportunities for collaboration between domain experts in climate change, new media researchers, and stakeholders. (Please keep in mind that these categorical terms are approximate, and also that these should be considered as categorically "leaky bins": there are clear crossovers between them, as indeed there should be in the GRAND spirit.) Project proposals (at different levels of completion an resolution) are attached for each.

1. Social practice using new media around sustainable living and working (NMSPS). Key to this project are issues of what motivates human actions around sustainability in dally practice, at both an individual and a larger collective scale (neighbourhood, household, community, workgroup or other groups.) Approaches that rely on the "rational actor" model of human behaviour are proving ineffective, but there are clear - if scattered - examples where strategies aimed at motivating behaviour have been successful on a

specific scale (water conservation in Australia is one such.) Policy makers and planners are particularly challenged with the balance of intrinsic and extrinsic motivation factors that can engage communities.
The research scope of this project is large, and will include psychology, media studies, human-computer interaction research, behavioural economics, energy modelling and climate change science. Key stakeholders in BC include municipalities such as the cities of Vancouver, Surrey and Victoria, and the energy utilities of BC Hydro and FortisBC and the Pacific Institute for Climate Solutions.

2. Buildings, users, Sustainable Systems (BUSY). Networked systems for monitoring and control enable non-intrusive ambient awareness of building performance, but they often do not provide appropriate information and control choices to building occupants. New energy and water monitoring systems from industrial partners combined with prototype interfaces can promote awareness, understanding, prediction and control. This project explores the design, deployment and evaluation of human-centred systems for sustainable living and working.

   Trial deployments are needed to both measure how well information about building performance improves conservation and sustainability outcomes Field studies will be designed to monitor not only individual installations, but also to implement and monitor neighbourhood and other community/collective deployments. The core of this research will involve interactive computing, visualization, machine learning research, environmental psychology, and building energy experts. Key stakeholders include public utilities, community groups, municipal governments, and developers.

3. Design as if people mattered: People and Resources in Interactive Design Environments for Sustainability (PRIDES). Tools and approaches for designers and decision makers (planners, policy makers, resource providers, municipalities, etc). How do we incorporate the understanding of human motivation and human-building interaction into the user interfaces and design spaces of the people who make, configure and manage the built environment? This project will explore the use of visualization, design alternatives, simulation and adaptive systems to engage and model human interaction at all levels of the design process for the built environment.