

Implications

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Sustainable Design Influences Social Change

Simon Jackson, PhD, and Mark Strachan

Sustainability—a popular term in design practice and design research that can be defined and discussed from many perspectives. This issue of *Implications* focuses on ways in which issues relating to sustainability can be explored in the realms of education, social change, and the built environment. Three projects relating to sustainability in the realms of social change and the built environment will be reviewed.

The Faculty of Design at Swinburne University of Technology (Swinburne Design) in Melbourne, Australia, have a commitment to sustainability as a field of research. Along with internationalization and research, Ken Friedman, Dean and Professor, sees sustainability as a key theme in the education of design students.

Learning units on sustainability are continually being developed and embedded into the design curriculum. Interior Design and industrial design incorporate sustainability in design studios, using sustainable design methods such as life-cycle assessment. In communication design, students

engage in environmental design issues. Professor Lyndon Anderson states “we believe that sustainability will be very important to the future of design practice and research, and the skills our students are learning, valuable to industry and practice.” He has coined a phrase the “New Design Nexus” to describe the point of intersection between three phenomena:

1. The rise of information and communication technologies and digital design
2. Changing demographics in the Western world
3. The rise of sustainability as a global issue

Professor Frank Fisher, Faculty of Design and Convenor, Graduate Programs, National Centre for Sustainability, is another sustainability research leader, at Swinburne. The Faculty has embarked upon an ambitious program to render all activities sustainable. Fisher, Australia’s first National Environmental Educator of the Year (2007-8), has been appointed to initiate this work. His approach has been to create six working groups under the banner of a new basis for education: “to create a literate, numerate, and considerate world.”

Swinburne University is committed to learning, teaching, and researching for sustainability while building



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a sustainable workplace and is committed to leadership in sustainability education, professional practice, and consultancy services. Swinburne Design actively supports other sustainability programs of the broader University such as the National Centre for Sustainability, and Swinburne's participation in the Sustainability Covenant of the Victoria Environmental Protection Agency.

Beyond the University, Swinburne Design is a partner in dynamic research projects. In February 2008, Swinburne Design adopted the *Designers Accord*. The *Accord* was developed to encourage design firms and designers in a simple, actionable sustainability program by educating clients, improving design processes, reducing wasteful resource use, and eliminating harmful outputs. The *Accord* is a global initiative led by Valerie Casey of IDEO, and Swinburne Design, under the leadership of Professor Ken Friedman, has been an early adopter in embracing its aims and values (www.globaldevelopmentcommons.net/node/1072). Swinburne Design was the first design school in the world to adopt the *Accord*, and the first organization in Australia to do so.

Design is a multi-disciplinary service industry responding to needs of clients, the needs of the community (i.e., accessibility, aging issues), and responsibility to the environment (sustainability). Negotiating between all these sometimes conflicting interests is where the creativity really comes in. Fostering and supporting this vision is the responsibility of design educators. The three projects being showcased in this issue of *Implications* reflect different aspects of our undergraduate programs and graduate research projects.

The first project, *The Games*, features a team of undergraduate students from our Multi-media Design program who are exploring the proposition that positive sustainability outcomes demand

behavior modification. They do this through designing multimedia games. Our second featured project, *Safe and Sustainable Indoor Cleaning*, is drawn from current PhD research investigating how designers can engage the experience and expertise of the user by employing a participatory design method. Finally, two designers explore new ways of working with an old material—Wood—in a joint Government and industry-funded research program.

Project 1: Interactive, Online Games

James Marshall, Bill Trikojus, Steven Murdoch, Shaun Britton, Anthony Kolber, and Multimedia Design students

Play can be a great educator and a way of generating social change. For the last two years, the Multimedia Design undergraduate program has offered capstone projects that involve the development of online computer games. Each game represents the combined work of 80 students and more than 17,000 hours of collective research and development over a twelve-week teaching semester. The games, called *MissionH2O* and *MissionCO2*, target secondary-school students and focus on the sustainable use of water and energy respectively. *MissionH2O* (www.missionh2o.com.au) was launched commercially in 2008 and has received broad press coverage, and many national and international awards for teaching and industry excellence (see Figs. 1 & 2).



Fig. 1: *MissionH2O* raises water conservation awareness for K-12 students. Fig. 2: (next page) Examples of the interactive game from *MissionH2O*.



MissionH2O

The MissionH2O project is a not-for-profit venture between Swinburne Design and the Savewater!® Alliance. The Savewater!® Alliance works with member water businesses, government agencies, and product companies to deliver water conservation programs throughout Australia. The aim of the project was to create an online computer game for secondary school students that would raise awareness about the serious and immediate issue of water conservation.

The project utilizes cutting edge web development technology, sophisticated aesthetics, narrative, character development, and humor to convey a scientifically accurate message of conservation and sustainability. The computer game takes the form of a digital pop-up book. The narrative is developed through a rich range of media content that includes video, sound, 3-D animations, and interactive games. By playing the games and helping each character optimize their water usage the player earns points to be entered into a drawing.

MissionCO2

In 2008, following the success of the MissionH2O project, another game was developed called MissionCO2—The Carbon Tradies (www.missionco2.com). MissionCO2 deals with the global issue of

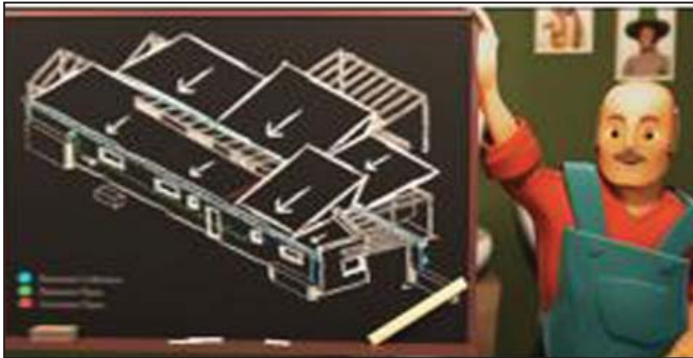
sustainability through energy conservation. The target audience is secondary school students along with an additional target audience of new homebuilders. Seven characters known as the ‘Carbon Tradies’ (the word ‘Tradie’ is Australian slang for tradesman or contractor) guide the user through the game, giving energy saving tips via a series of animated narratives.

The Carbon Tradies—an architect, plumber, electrician, chef, mechanic, builder, and gardener—address a broad range of sustainability issues, from the optimal location and orientation of your house to cooking with the most efficient kitchen appliances. The objective of effecting real-world change shapes the format, progress, and information being communicated in MissionCO2. The research is separated into two categories: sustainable activities that don’t cost money (e.g., using a ceiling fan rather than an air-conditioner) and activities that require investment such as installing a solar hot water system. This has been done to reflect the capabilities and resources of secondary school students and new homebuilders, respectively.

The art direction of MissionCO2 uses characters with human proportions and stylized, proportionally correct environments (see Figs. 3 & 4). This realism allows the characters to interact with the objects and environment in a way that is instructional and realistic.



Fig. 3: The seven Carbon Tradies teach energy conservation. Fig. 4 (next page) Examples of the interactive online game from MissionCO2.



MissionCO2 has a strong narrative component communicating more than 70 key suggestions for sustainable living through 15 minutes of high quality, 3-D animation and 30 minutes of interactive game play. The MissionCO2 game launched in May 2009.

Project 2: Safe and Sustainable Indoor Cleaning

Carolyn Barnes, PhD, and Simone Taffe, (PhD candidate)

Internationally, sustainability measures are currently implemented on two levels. One is through developments in technologies and infrastructure, legal and policy frameworks, and forms of governance. The other is within the domain of everyday life, through peoples' individual choices and actions. Carolyn Barnes and Simone Taffe use participatory design to match information on low-harm cleaning to the situation and perspectives of childcare workers. Their research is part of the government-funded project Safe and Sustainable Indoor Cleaning (SASI Clean), a pilot study into the reduction of environmental impacts and health risks through the use of safe and sustainable indoor cleaning in childcare centers. Cleaning with a mild, pH-neutral detergent diluted in water is an effective and approved method for cleaning surfaces like baby change mats and nursery tables. Yet many childcare centers use a medley of surface sprays, disinfectants, harsh detergents, and air-fresheners, showing that information alone is not enough to influence attitudes and behavior. For Barnes and Taffe the issue of cleaning

childcare centers highlights a major challenge for the sustainability message, which is sent into a vast array of social and cultural situations. In the SASI Clean project childcare workers and designers worked together to develop designs that combined childcare workers' understanding of the childcare context with designers' knowledge of visual communication and design production.

Sustainability can fall off the radar for childcare workers confronted with the relentless cleaning associated with young children and with parents and governments who are very concerned about hygiene issues. An important priority of the SASI Clean project was increasing childcare workers' commitment to sustainable choices by empowering them to make their own decisions about cleaning practices. Prototype designs were typically templates, allowing the staff of childcare centers to formulate their own scripts for low-harm cleaning.

Project 3: Sustainable Design Using Wood

Lyndon Anderson, Professor and Blair Kuys, (PhD candidate)

Industrial design and the built environment are other arenas in which sustainability issues should be explored. The product development and innovation research cluster at Swinburne Design has pioneered the use of design as a key component in the development of sustainable new materials, production technologies, and systems; all of which expand the boundaries of the design profession and assist the faculty in repositioning the value of design research. Lyndon Anderson, Professor, and Blair Kuys, PhD candidate, have been involved in the Cooperative Research Centre (CRC) for Wood Innovation.

The brief for CRC Wood Innovation was to develop and commercialize revolutionary technologies and extend relevant research to establish wood as the sustainable material of choice. Designers collaborated with the

Commonwealth Scientific and Industrial Research Organization (CSIRO) scientists, Melbourne University, the Government, and numerous industry partners in a seven-year research project linked to positioning timber as the sustainable material of first choice for the furniture and construction industry sectors.

Anderson describes the sustainability considerations of his research: “The CRC for Wood Innovation provided an opportunity for me to explore both emergent and traditional wood-based technologies from across the globe with a view to embedding this knowledge into the initial stages of scientific enquiry, setting research agendas, and gaining further support from industry and government.” The form of the “Girata” coffee table (see Fig. 6) embodies the absolute limitations of the most advanced bending technology on the planet; bending rather than joining is often more sustainable because it reduces the number of components and stages of production.

From a theoretical perspective it was argued that the form of the table would be impossible to produce, yet here it is. The table is cut, bent, and twisted from a single length of beech timber. Because there are no joints or mechanical fixings of any kind, the table will survive the climatic variables associated with long sea voyages resulting in opportunities for new export markets whilst increasing the profitability of exporting Australian products. The table can also be exported in a pre-bent form creating further opportunities for

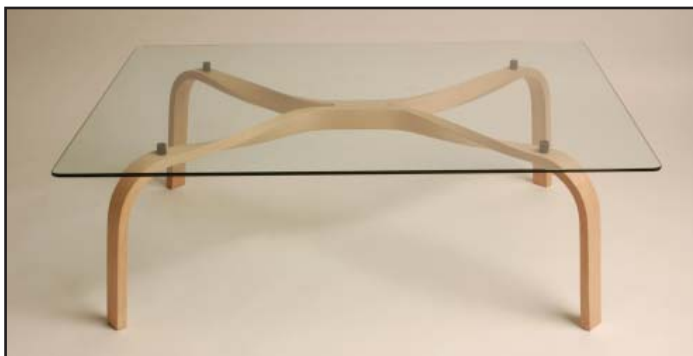


Fig. 6: “Girata” coffee table designed by Lyndon Anderson.



Fig. 7: Kuys' timberwood frames.

cost-effective distribution due to its limited space requirements during transportation; 100 units can be stacked on a single pallet resulting in fewer fossil fuel miles per unit.

The “Girata” pays homage to the bent wooden furniture of Scandinavia by incorporating certain traditional characteristics into its form such as the angle of the leg as it

touches the floor, cross sectional dimensions, the choice of beech, and the use of soap as a finish (see Fig. 7). However, the table is derived from 21st-century bending technologies and is not subject to the failure rates associated with traditional bending technologies. There is little waste due to off-cuts and almost zero-waste due to the eradication of production problems.”

Professor Anderson, as one of a team of experts derived from industry, academia, and government recently produced a ‘how to’ kit on sustainability to highlight the economic, environmental, and social value of addressing environmental factors in the creation of products, services and spaces. Called “Sustainability by Design,” the kit is part of the Victorian Government’s agenda to increase design knowledge within small and medium-sized enterprises.

Blair Kuys’ research has promoted timber as the sustainable material of choice for outdoor use in the window construction industry. The major problem affecting timber products intended for outdoor applications is the liability for timber to rot when exposed to weathering due to UV degradation and fungal attack. To prevent this problem, all timber species used in outdoor environments require a protective coating. The problem that currently exists is that protective

coatings delaminate after prolonged exposure. Kuys' research alleviates problems by clarifying the mechanisms of adhesion, the changes in wood chemistry after prolonged exposure, and surface modification processes. The latter involves grafting specific types of connector molecules, which form durable molecular bridges between the surface of the timber's structural constituents and surface coatings. Results of adhesion bonding tests demonstrate, on average, a four-fold increase in tensile strength compared to unmodified samples, with two-species achieving an overall increase, ten-fold, that of an unmodified sample of the same species. The success of this practical testing is applied in the development of a timber window frame that utilizes this new technology to create an environmentally friendly product outcome.

Designing for sustainable production and consumption should never be underestimated. Innovative design solutions play a key role in the manufacturing of timber window frames: design contributions that successfully repel water, allow for continuous air circulation, and prevent rot and decay which currently hinder the advancement of timber as a material of choice for window frame development.

Engineering sustainable timbers to the same tensile strength levels as unsustainable timbers for adhesion bond applications, not only limits the destructive nature of deforestation of old-growth forests, but also saves the consumer money. Cost benefits of sustainable plantation timbers are significant when compared to the price of unsustainable hardwoods, which will become more expensive as they become scarce. Sustainable plantation timbers are also less expensive than aluminium and PVC, materials that currently dominate the window frame market and have a much larger embodied energy than timber.

References

- Anderson, L., & Jackson, S. (Eds.). (2006) *The New Design Nexus: ICT, changing demographics and sustainability*. Melbourne: lab.3000 at RMIT.
- Fisher, F., edited by Fran Macdonald, (2006) *Response ability: Environment, health & everyday transcendence*, Elsternwick, Victoria: Vista Publications.
- Eco-design projects from the Faculty can be seen on the EcoDesign Resource, a web-based showcase led by PhD candidate Judith Glover and Lecturer in Industrial Design, Mark Strachan. See: www.hed.swinburne.edu.au/design/eco_design/index.html

Resources

- www.swinburne.edu.au/design/nidr/concentration/product.php
- www.missionh2o.com.au
- www.missionco2.com
- www.ecoinnovationlab.com
- www.globaldevelopmentcommons.net/node/1072

About the Authors

Simon Jackson, PhD, is the Head of the academic group Design Society and Culture, and the Faculty of Design, at the Swinburne University of Technology, located in Melbourne Australia. Jackson's research explores the role history can play in informing new and sustainable product development. His recent articles appear in *Design Issues*, *Journal of Design History*, and *Journal of Design Research*. Jackson is currently co-editing a sustainability issue of the journal *Artifact*, with Eli Blevis, Carla Cipolla, and Ezio Manzini.



Mark Strachan is a Lecturer in Industrial Design, Interior Design and Product Design Engineering at the Faculty of Design, Swinburne University. Having graduated from De Montfort University (Leicester Polytechnic) in 1984 with Honours in Industrial Design (Engineering), he embarked on his design career pioneering the design and development of early generation mobile phones, accessories, and infrastructure products in the telecommunications industry with Racal Vodafone.



Strachan has been in professional practice as a design consultant for over twenty years specializing in interaction design and product development, and has gathered extensive experience in the development of new products, systems and services for a diverse range of clients. Mark is a passionate proponent of sustainable design and draws on his experience of interaction design and its user-centered principles to create new and challenging curricula that address the complex nexus between technology, the environment, sustainability and the user.

Related Research Summaries

InformeDesign has many Research Summaries about sustainable design, and other related topics. This knowledge will be valuable to you as you consider your next design solution and is worth sharing with your clients and collaborators.

“Habits and Emotions Influence Environmental Decisions”

—*Journal of Environmental Psychology*

“Networks Help Achieve Sustainability”

—*Landscape and Urban Planning*

“Better Use of Sustainability Tools”

—*Indoor and Built Environment*

“Evoking Surprise in Product Design”

—*Design Issues*

“Ecology, Expansionism, and Sustainable Planning”

—*Journal of Planning Literature*

Images Courtesy of

Krista Lindegger (header photo)

Swinburne Multimedia staff & students (Figure’s 1, 2, 3 and 4)

Lynette Zeeng (Figures 5 & 6)

Front Image

BreezeWay by Krista Lindegger, Bachelor of Design (Industrial Design) at Melbourne Design. The BreezeWay was designed to dry clothes gently, all while hanging in a locked-up, pull-out cupboard. It is ideally situated on rooftop or other communal areas with wind exposure. Wind cowls draw in breeze, sunlight heats up glass house and dries clothes gently while hanging in a locked up pull out cupboard. Ideal for people without a backyard, balcony or terrace, or for drying during rainy weather. The BreezeWay was exhibited as part of the Victorian Eco Innovation Lab (VEIL) in 2009.



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