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# Building the Sustainable Library at Macquarie University

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## ABSTRACT

This article explores a number of current issues and challenges in sustainability, both of and in academic libraries of the future, using the new Library opened at Macquarie University, Sydney in 2011 as a case study. Issues covered include sustainable design and operation of library buildings, sustainability in relation to library collections and the reframing of library organisational design and service provision for the future.

## INTRODUCTION

In December 1992 the Council of Australian Governments endorsed Australia's *National Strategy for Ecologically Sustainable Development* in the context of the United Nations Conference on Environment and Development (UNCED) agendas on climate change and sustainable futures. The goal of the Strategy is "development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends." The first Guiding Principle of this Strategy is that "decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations." (Australia. Department of Sustainability, Environment, Water, Population and Communities, 1992).

Library interest in these issues has been traced back to the early 1990s (Antonelli, 2008) and is also evidenced by many peak bodies in the library profession, such as the International Federation of Library Associations' Special Interest Group on Environmental Sustainability, the American Library Association's Task Force on the Environment and the Australian Library and Information Association's Sustainable Libraries Group. This Group defines its scope to be "three key areas: environmental, social and financial. To be sustainable is to meet the needs of today's society in a way that doesn't harm the ability of future generations to meet their needs. The consumption of finite resources and sustainable development are key concerns of society and therefore of libraries. The Sustainable Libraries Group will focus on the key areas of sustainability as applicable to the operation of libraries" (Australian Library and Information Association, 2012). Even Wikipedia (accessed January 2012) has an entry on Green Libraries which raises some of the conflicts that libraries can encounter on the "green" path, such as the energy costs of providing environmental conditions conducive to the preservation of objects and documents for the future.

The American Library Association's Task Force on the Environment identifies three key dynamics in its framework for a responsible approach to the future: "economy, ecology and equity" (American Library Association, 2012). More recent writers also take this broader approach, describing issues of sustainability both *of* and *in* libraries. For example, Jankowska and Marcum identify several categories of topics for discussion: sustainability of scholarship and collections; green library operations and practices; green library buildings; and measuring and improving sustainability (Jankowska and Marcum, 2010). They identify some major challenges facing academic libraries in particular: how can we continue to grow our

collections without substantially increasing our impact on the environment? How do we continue to make these collections available in an equitable way? This broader approach is also echoed in Wikipedia's definition of sustainability: "Sustainability is the capacity to endure. For humans, sustainability is the long-term maintenance of well-being, which has environmental, economic, and social dimensions.... In ecology, sustainability describes how biological systems remain diverse and productive over time..." (accessed 3 January 2012).

This article adopts this broader approach to sustainability. Using the new Library at Macquarie University as a case study it explores the decisions we have made to achieve sustainable building design and operation, sustainable collection development and the related areas of the sustainability of library organisational design and service provision for the future.

## **SUSTAINABILITY AT MACQUARIE UNIVERSITY**

Since 2006, Macquarie University has been positioning itself to become a world-class research intensive university and has recently demonstrated significant progress towards this goal. In 2010 the Australian Government assessed the research quality of all 41 Australian universities in the Excellence in Research for Australia process. In total, 80 per cent of Macquarie's research activity was rated as performing at world standard or higher, with environmental sciences subsequently being ranked as 14<sup>th</sup> in the world (Australian Research Council, 2011).

In the context of the *National Strategy for Ecologically Sustainable Development* the University is also seeking to become a leader in sustainability. Part of the University's vision is to be "ecologically sound, socially just and economically viable in all of its activities" (Macquarie University, 2009, 13) and to undertake a process of renewal for the curriculum, its services and its facilities. According to *The Australian* (Hare, 2011) Macquarie now ranks as number three among Australian universities for its approach to sustainability. In 2010 Macquarie won the NSW Green Globe Public Sector Award for its holistic approach to sustainability, was the NSW Keep Australia Beautiful runner up for water conservation, and was highly commended for waste minimisation.

I have previously published the background and vision for the creation of the new Library at Macquarie University (Brodie, 2008). In addition to applying principles of sustainable building design and operation, the new Library also symbolises the University's research aspirations and aims to be an exemplar of "sustainability in action" for the University community. In the context of a more holistic approach to sustainability we are also addressing the broader issues of a sustainable future for library resources and service provision.

## **SUSTAINABLE BUILDING DESIGN**

There are now many examples of new libraries around the world that have been developed using the principles of sustainable design (Edwards, 2011). Like most of these projects, Macquarie chose to apply an externally validated environmental assessment methodology to the design process for the new Library. The validation tool chosen for the project was the Green Building Council of Australia's Green Star Rating System and specifically the *Green Star Rating Tool: Education v. 2008*. This tool enables a design to be rated against a number of criteria: management, indoor environment quality, energy, transport, water, materials, land use and ecology, emissions and innovation. The new Library project aimed at achieving a

five star Green Star outcome by placing an emphasis on a number of design aspects. The most significant of these are described below:

#### Energy Management

The energy systems used in the new Library, including the incorporation of a thermal energy storage tank, are designed to produce a 25% reduction in annual greenhouse gas emissions and a 17% reduction in peak energy demand.

#### Water Management

The whole roof area (6,752 sq.m.) drains to a 278,000 litre rainwater collection tank which is then used to provide water for irrigation of landscaped areas, toilet flushing and other non-potable water uses. 67% of this roof area is landscaped (4,513 sq. m.) and has a dual function providing both thermal insulation and garden substrate for species native to the Sydney basin. Sanitary fittings and tapware have a Water Efficiency and Labelling Standard (WELS) rating. As a result the amount of potable water used is 0.31 litres/square metre per day.

#### Occupant Amenity

The temperature in client areas is maintained year round in a comfort range of 21-25 degrees Celsius. Natural light is introduced using light wells and skylights as well as windows. Lighting and air conditioning have sensors and are zoned for greater local control and the air change and ventilation rates are effective and conducive to study. The new Library is located close to the major bus and train routes serving the campus.

#### Choice of Materials

The steel, concrete, carpet tiles, ceiling tiles and drainage cells all contain significant amounts of post-consumer or post-industrial recycled content. Our loose furniture has a Good Environmental Choice Australia (GECA) certification and built furniture is designed for easy disassembly.

#### Learning about Sustainability

Another important Green Star requirement is that a project demonstrates the sustainability initiatives in the building through a variety of media. In this context the new Library has now become an important stop on the University's Campus Sustainability Tour and will also be part of the new University Arboretum. We also have a new sustainability module as part of the Library staff induction program.

The Green Star methodology also encourages the incorporation of innovative strategies and technologies in the design of the building. These strategies will be described in other sections of this paper.

### **SUSTAINABLE BUILDING OPERATIONS**

Sustainable design is only one part of the challenge. How do we know we are operating our library buildings sustainably? Fortunately many of the design features also provide the ability for us to monitor and fine-tune the operation of the Library building over time. In addition to the normal monitoring for emissions, water management and energy usage we are using a network of "people counting" devices throughout the building to assist us to achieve further efficiencies in the future based on actual visits to different areas of the Library.

The new Library was also designed to be a “living laboratory” so that aspects of its design and operations could be used as an integral part of teaching, learning and research. As an example, two masters level students in the Graduate School of the Environment have recently completed a major assignment to advise the Library on best practice in the establishment of an Environmental Management System to monitor our ongoing operations. They were able to identify one such plan in existence at a major library in Australia at the State Library of Victoria (2010). We intend to engage in such projects annually to continue to engage students in the operations of the Library, to build our Environmental Management System, to model the Library’s carbon footprint, to test calculators such as the one provided by the University of California, Berkeley (Saurabh, 2008) and to explore the initiatives taken by other libraries to monitor such areas as paper and packaging, travel, energy and water consumption.

Another innovation in the project has been the work on establishing a “green lease” for the Library café, which encompasses a range of sustainable outcomes for such things as food offerings, packaging, energy usage, and furniture choices and which also links in with the University’s Fair Trade accreditation.

In recent months the University has also begun exploring an ecological footprinting approach for both design and management of its buildings. The new Library is also being assessed using this methodology, which derives from the initial work at the University of British Columbia (Wackernagel and Rees, 1996).

## **SUSTAINABLE LIBRARY COLLECTIONS**

Given that the most sustainable outcome for the environment is “no building at all” then it is critically important to minimise the footprint of any new built space and its ongoing environmental impact. This immediately raises a conflict for libraries facing critical space shortages for their growing collections. The move to accessing collections electronically has begun to alleviate this problem, but a building full of computer devices (mobile or fixed) generates heat that also needs to be managed for the thermal comfort of the occupants. Macquarie has been an early adopter of the electronic-only format option and we now spend 79% of our annual collection development budget on access to electronic resources. Chowdhury has recently done some initial analysis on the carbon footprint of the knowledge industry (Chowdhury, 2010). His work suggests that an electronic future for books will indeed be more sustainable than print.

Macquarie is unique among large Australian universities because it has always had only one central Library with no separate subject collections or branches. So while we were not faced with the challenge of rationalising such separate collections, we did need to ensure good access to our physical collection, particularly for disciplines still heavily reliant on print for research and teaching, such as ancient cultures. For these disciplines the overwhelming preference was for convenient onsite access rather than an offsite solution.

To address the issue of responsible growth in relation to both built space and energy consumption, the new Library is the first in Australia to contain an automated storage and retrieval system (ASRS) to provide for the storage of 80% of the physical collection. Our ASRS solution was provided by HK Systems (now Dematic) as used in a number of North American libraries. This technology was chosen so that we could minimise the environmental impact of the building while at the same time providing space for almost double the physical items (2.3m items) and more than doubling the client seats (3,000) – all in a new Library that

is roughly the same overall size as the old one. Since our data suggested that 20% of the physical collections satisfy 80% of the usage we designed our ASRS with storage capacity for 1.8 million items and open shelves with capacity for 500,000 items to facilitate browsing. While still allowing us to keep all of our physical collections onsite, this approach has reduced the floor space we would have needed for the traditional open shelf access model by 38% (11,000 sq.m.) and will reduce our projected greenhouse gas emissions by 817 tonnes per year. The ASRS is housed in a separate “compartment” within the building. This also allows us to resolve the people/paper conflict for 80% of our collection by providing the ideal conditions for paper preservation in this space (18-21 degrees Celsius and 50% relative humidity).

We established a set of agreed Collection Storage Principles to guide our decision-making in what material was to be stored on the open shelves and what material was to be stored in the ASRS. We generated profiles of the collection for each discipline and were able to use this data and the Principles to inform our consultations with academic staff and to fine-tune the location of items. This has been a highly successful project with outcomes for ongoing collaborative collection development and is described in more detail elsewhere in this issue (Kattau, 2012). We wanted to ensure that, as much as possible, a new student to a discipline could get a sense of the literature of that discipline by looking at the items on the open shelf. To assist with this we have also interfiled what remains of our printed reference collection in with the literature of the discipline.

The major concern raised with storage systems of this kind is the perceived lack of access to browsing the collections. To help alleviate this concern we have also introduced a “virtual bookshelf” in our catalogue to allow users to scan the items that would be adjacent by classification, whether they are stored on an open shelf, in the ASRS or are in fact in electronic format (Burton and Kattau, 2012). The extensive consultation process coupled with the introduction of the Virtual Bookshelf has meant that we have had very little negative feedback from our clients on the use of the ASRS (Peasley, 2012). As at December 2011 we have retrieved more than 20,000 items from the ASRS for clients.

While this storage solution might be more sustainable there is still the broader question of whether the way in which we acquire our access to scholarly publications is now economically sustainable. Like many universities around the world, Macquarie University is exploring other models. In 2008 Macquarie introduced an open access policy to provide equitable, world-wide access to its scholarly and research output. In the same year we began the implementation a repository for this material, *ResearchOnline*. During 2011 there were 215,000 accesses to our repository from all around the world. But while open access may bring more equity of access is it a sustainable economic model? Recent studies (Houghton, 2011, Research Information Network, 2011) carried out in the UK suggest that both the “gold” and “green” versions of open access may be more economically viable in the future than the existing subscription model. Both of these models assume that journals in the form we know them will continue to be produced – the issue is whether payment occurs at the pre- or post- production phase.

Are there alternatives to these models of scholarly communication? Studies like the Research Information Network report cited above suggest that the “pay-per-view” article access model (including “article rentals”) will prove too expensive and difficult in terms of management of micropayments by publishers or intermediaries and will exist as an adjunct to other models. What about a new digital information system that more closely integrates with the scholarly

research process, as mooted by Van de Sompel et al. in 2004? As they indicate some of the elements of this new model already exist – it is the development of more pieces of the system and interoperability between them that remains the challenge. One very important concept emerging from this work was the redefinition of “units of scholarly communication” (Van de Sompel et al. 2004, 3) – the concept of dynamic content including datasets, simulations and software. This is what will make the scholarly communication network of the future different from the old print world and the current world of static publisher or self-archived PDFs. While there will still need to be processes of peer validation and recognition it will be interesting to see how new collaborative tools and other social media will influence the emergence of a new system – and what (if any) role the academic library will play in such a system.

## **SUSTAINABLE LIBRARY ORGANISATION AND SERVICES**

The building of the new Library has acted as a catalyst for change of other kinds. Anderson (2011) suggests that all academic libraries are indeed at an “inflection point” which we ignore at our peril. He proposes that we need to change our structures and functions to be able to continue to deliver something or value to our clients. At Macquarie we have been working on various aspects of renewal since 2006, when planning for the new Library began. We have already published the process and outcomes of the first stage of the changes made (Brodie and Martinelli, 2007).

In the second stage of this process we have been taking a holistic, iterative and inclusive approach to organisational design based on Galbraith’s “star model” (Galbraith, 2001). This gives us a framework to explore the relationships between strategy, structure, people, process and recognition. We began with strategy and developed strategic aims that were derived from the University’s academic plan to 2014 (<http://www.mq.edu.au/library/about-the-library/strategic-plan.html>). As part of this process we involved all staff in developing a shared understanding of what the University’s six core values (ethical, creative, agile, inclusive, enquiring, and excellent) meant to us in the Library context. This work has also been documented in more detail (Brodie and Graham, 2010). The next step in this process is to examine whether our values are congruent with those of our clients – to see if our perceptions of the value of the Library match.

This work is extremely important to our defining metaphor for the library - “library as ecosystem” (Giesecke, 2011, 61). This metaphor enables us to shift from a collection-centred past to a client-centred future by building sustainable relationships. It also provides the framework to explore the “mutual benefits” in the system – how we add value to the learning, teaching and research processes. As Oakleaf (2010) indicates, the search for quantifiable metrics is difficult, but it is essential that we develop a new shared understanding of the library’s contribution to the academic mission.

As part of the move to the new Library in 2011 we put in place the first stage of a new organisational structure designed to reinforce partnerships within the Library as well as with our clients. Our strategy is reflected in this structure through a focus on services, resources and capability development in people, space, systems and processes. In 2012 we are moving to the second stage, with an emphasis on the definition of a new services strategy, a resources strategy and the changed roles that will deliver value to our clients. We have also engaged external assistance with process mapping and review using a client-centred approach.

So what new or changed knowledge, skills and attributes will our staff need in this new “ecosystem”? Partridge et al. describe the results of their investigation into this issue in terms of “Librarian 2.0” (Partridge et al. 2010). Their findings emphasise that, more than anything, what is needed is change of the mindset of academic librarians. We are exploring these issues through the development of our workforce plan for the future and by engaging staff in the change process in as many different ways as possible. Recognition of staff will continue to come in a variety of ways – clarity of role definition and appropriate remuneration, job satisfaction, growth opportunities, positive client feedback and celebration of achievement.

## CONCLUSION

Of course, the most critical part of any library “ecosystem” is its user community. The new Library at Macquarie became fully operational on 1 August 2011, so we have not yet had time to gauge the longer term impact of our design decisions. However, we do have some initial feedback.

When the Library was officially opened on 8 August 2011, Vice Chancellor Professor Steven Schwartz (2011a) said “This is the day we have been waiting for. Our new Library is open. It’s not only a place of light and learning; it’s also the most stunning building on campus. Our architects and builders should be proud of what they have achieved. I know I am proud to have such a library and such a beautiful building at Macquarie..... When it comes to learning, libraries remain as relevant as ever and this one is the best of all.”

To find out what our clients think we have been collecting feedback in many different ways, including the use of Twitter and Facebook. Here are some student “tweets”:

@MQ\_library ...I already feel at home! \*love\*  
The new library is awesome @MQ\_Library  
Gotta love @MQ\_Library ... found lots of resources for my assignment. Whoo hoo!

*Sydney Morning Herald* journalist Jen Rosenberg asked students what they thought about the new Library on the first day of operations: “Curious students poured into the new library yesterday on the first day of second semester. Nomiky Panayiotakis, a second-year law student, said the extra space and the new retrieval system were appealing and she was likely to spend more time using the library for study” (Rosenberg, 2011).

We have also conducted some more formal surveys. The First Impressions Survey was conducted in August 2011 with 500 respondents registering an 82% positive overall impression. The full Library Client Satisfaction Survey was conducted in October with 2,344 respondents. The Library improved its performance score on all five best practice categories, with the largest improvement (10%) in Facilities and Equipment. During 2011 new Library usage averaged 8,800 per calendar day, peaking at 10,000 per day during October. In contrast usage of the old Library peaked at 5,500 per day. Web visits have also continued to trend upwards, with an 18% increase in average visits per day to 16,600 during 2011.

There is also some evidence in the Client Satisfaction Survey that our clients are aware of the sustainability features of the new Library and rate us as performing well on these. Of course there are also issues we are working on to fine-tune both the building layout and our services and this is part of our normal cycle of quality improvement.



There has also been much interest in the new Library from the wider community. During 2011 we ran over 100 tours of the new Library for 2,000 participants and the implementation of the ASRS has engendered much interest as an innovation in library design in Australia (Australian Broadcasting Commission, 2011).

For me the most exciting things about the new Library are that students have flocked to use it and that the new building is becoming the “living laboratory” for research and learning about sustainability. It is “a real investment in the future of the University and our students” (Brodie in Schwartz, 2001b).

However, even with such a new and sustainable building, we still need to keep our eye on the future. In 2011 the US University Leadership Council published a detailed report on a range of areas for academic libraries to consider when reframing their role for the future. This report contains an evaluation guide across three key areas: leveraging digital collections, rethinking the scholarly publishing model and repurposing library space (University Leadership Council, 2011, xiv-xv). While such a checklist approach may be useful it does not, by itself, encourage the responses to be considered in the context of university strategy or the library’s value proposition. Simon Sinek (2010) contends that organisations spend too much time on thinking about the “what” and the “how” and fail to realise that it is the “why” that matters. If we are to move from being custodians of the past to being successful facilitators of the future we need to revisit and reaffirm the “why” - but in the context of what is valuable to our clients. This is how (and why) we will really build the sustainable library of the future.

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