BattleLAB: Interdisciplinary Sustainable Preservation Research and Action

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Introduction

Battle Hall is a building with a story to tell. Having just celebrated its 100th year in service to the UT campus community, Battle has a long history of meeting the needs of varied users and creating a distinct sense of place for all who visit. Looking forward to the next 100 years, Battle Hall’s legacy will continue to be one of adaptation and excellence in integrative design. With building renovation slated in the next few years (paired with its neighbor, West Mall Building built in the 1960s, and a new addition), Battle Hall creates an opportunity for the UT community to learn from the past while preparing for the challenges facing future generations of UT students, staff, and faculty. In embracing this opportunity, BattleLab will present an innovative showcase for sustainable preservation. Embracing this opportunity, the Center for Sustainable Development (CSD) launched “BattleLab,” a project that will present an innovative showcase for sustainable preservation to the world.

One of the greatest challenges future generations face is creating new ways of designing, renovating, and managing our buildings that will not only reduce their carbon footprint, but also positively contribute to the ecosystems upon which they depend. With over 19 million square feet of existing conditioned space on campus, the challenge is how to make our existing buildings models for regeneration instead of consumption. This challenge extends well beyond campus: as of 2003, 72 percent of floorstock in the U.S., or 46 billion square feet, belongs to buildings over twenty years old (Commercial Buildings… 2003). How could Battle Hall help prepare us to meet these challenges and empower our students to thoughtfully steward places of historic and ecological importance? Can we use this building project to help deliver UT-Austin’s teaching and research mission?

Project Status

Starting in the Summer of 2012, faculty and staff at the University of Texas have
engaged deeply in dialogue around this core question, especially as it relates to promoting university research agendas and enhancing the education of their students. From these conversations with over 45 faculty and 13 different departments and campus organizations, a cohesive vision for the BattleLab initiative emerged, including a number of promising research agendas and innovative academic courses:

- **Ecology:** opportunities for life-enhancing design
- **Energy:** optimizing energy performance
- **Materials:** building to last
- **Human agency:** behavior, learning, and well-being
- **Pedagogy:** transdisciplinary sustainable preservation research & seminar

Although we have divided them into five categories, these faculty research and teaching ideas are highly interconnected. Each of these proposed research groups includes rigorous assessment of existing, contextual conditions that will inform potential design interventions. These potential interventions will then be tested as pilot projects with the intent that promising pilots will then become formal design recommendations.

For instance, the “Energy” research group plans to experiment with green building technologies such as heliostats, various passive and active ventilation strategies, and innovative façade systems. Based on observed thermal and lighting qualities of the buildings and inhabitant preferences, researchers can strategically test small installations of these technologies prior to construction, monitor results, and then subsequently propose recommendations to the renovation design team based on the results.

Critical to making these complex research agendas accessible to building occupants and visitors is the creation of an innovative and dynamic visualization tool. This tool will make invisible elements of the built environment tangible, visible, and engaging by translating the research data – including social, historical, and complex resource system information about the campus’ built and natural environment – into an easily understood format. This information will help building users and campus visitors understand the relationships between design and environmental conditions early in the renovation timeline, preparing them to participate as informed stakeholders in design decision-making. Beyond its role in this participatory design process, this place-based information will foster more meaningful connections to place and develop environmental stewardship values and behaviors.

**Engagement Dashboard Pilot Project**

In the course of BattleLab interviews with UT faculty and staff, the CSD team noted a growing interest in new ways to communicate place-based historical and ecological information to UT visitors, students, and prospective students. Through the University’s Green Fee program, the CSD received funding for a pilot visualization project, or building “dashboard,” for Battle Hall and West Mall buildings and sites. The Engagement Dashboard project will commence in the Fall 2013 and will engage University classes, staff, and industry partners in the collection and display of energy, ecological, and historical data. This project continues to seek cross campus collaborators and funding for expansion of the dashboard to integrate campus-wide data and to create more innovative and interactive elements within the larger dashboard framework.

**Next Steps**

With three years or more before the official design and renovation of Battle Hall and West Mall Building, the BattleLab initiative is poised to instigate
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essays

and material composition), the connections to surrounding buildings and the broader city, and the larger regional landscape and ecosystem. Additionally, buildings designed and built prior to air conditioning and aggressive environmental controls offer a unique opportunity to identify past low-energy techniques and strategies. New interventions for green infrastructure might adapt these historic techniques to current needs.

Research tracks

1. Ecological form, function and performance: past and present.

Sustainable preservation concerns itself with historic ecological forms and function that predate construction including a building’s history and values and how the building has affected the performance of surrounding ecosystems. How have social,
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as lighting fixtures and controls, dedicated HVAC equipment, surface finishes, etc. The performance of these elements could be tested and monitored not only as individual systems, but also in combination and synergy with each other.

3. Policy and economic evaluation

New technologies and innovative strategies are often implemented in isolation with little time or incentive to evaluate them from a long-term economic, social, and policy perspective. This research area would consider the larger context of these experimental approaches and technologies.

4. Demonstration and display

Building inhabitants have potential to play a large role in reducing energy use in buildings if they are informed about existing usage and strategies for reduction. This group of research initiatives considers not only how to accurately document energy usage, but also how to meaningfully present that information to occupants in a way that encourages energy use reduction.

Research Group - Materials: building to last and for future use

Description

Building-related construction and demolition debris totals approximately 160 million tons per year, accounting for nearly 26 percent of total non-industrial waste generation in the U.S., and only about 20 to 30 percent of this debris is recovered for processing and recycling (“Buildings and… “ 2009). On average, Americans spend about 90 percent
or more of their time indoors, where pollutant levels may be two to five times higher, and occasionally more than 100 times higher, than outdoor levels ("Buildings and..." 2009). New strategies, methodologies, and policies for materials selection, evaluation, and maintenance are needed to reduce consumption and improve indoor air quality. The goals of the Sustainable Materials group are to research new and existing materials and material treatments that will reduce material waste, reduce environmental impacts of materials manufacturing and transport, extend the lifecycle of existing materials, improve indoor air quality, and enhance building inhabitant experience. There are also significant economic implications for this research at the University, as repeated interior materials replacement is one of the largest cost items in the University’s facilities budget (Kraal 2008). With its University Co-op Materials Laboratory and the Materials Conservation Laboratory, the School of Architecture is well positioned to undertake this research.

Research track

1. Existing materials

Because of limited time in renovation design projects, existing building materials are typically evaluated only per generic guidelines that often do not reflect actual conditions, material performance, or maintenance practices. This research group considers new ways to sustainably extend building material life through both direct treatment (such as cleaning highly durable materials with products that have low impact on the environment and human health) and reassessment of retention/demolition decision-making guidelines (such as standard lifecycle predictions, archaic materials fire-safety evaluation, or ability to warranty salvage materials).

2. New materials and deconstruction

New building materials are often selected only for their cost,
availability, and visual, tactile, or acoustical qualities, not for their long-term energy performance capabilities, low environmental impact, or future potential for reuse and recycling. This group will identify and test innovative materials and develop new standards for evaluating new building materials also in terms of energy use and waste reduction.

3. Material effects and interactions

Material choices can significantly impact indoor air quality, acoustical and lighting performance, and building inhabitant psychology. This group considers the complex longitudinal interactions of materials with other dimensions of building performance and occupation.

Humans: occupant behavior, learning, and well-being

Description

This group is interested in researching healthy and sustainable building in terms of occupant productivity, learning, and well-being. Sustainable design must consider the dynamic interplay of technical and social systems and develop interventions that help buildings and their occupants co-evolve in sustainable directions. While we are measuring the water and energy efficiency outcomes of new technologies, we can also measure any significant changes in social and psychological outcomes. Can we use sustainable design to motivate sustainable behavior change in occupants and foster ecological and historical literacy, a sense of place, and an ethic of stewardship? Sustainable cultures and communities also depend on “non-expert” locals meaningfully engaging with “expert” designers and engineers, but this collaborative process becomes increasingly difficult in the midst of contemporary complexities and the specialized knowledge of the built environment. This group’s research will help develop tools to empower building visitors and users to participate in creating sustainable futures. To accomplish these goals, BattleLab will become an interdisciplinary research hub, where environmental psychologists, designers, and preservationists connect, collaborate, and innovate to create socially and ecologically thriving places.

Research tracks

1. Pre-renovation design & environmental psychology conditions

A thorough understanding of the current building spatial usage and environmental psychological conditions will inform future design choices, as well as provide the baseline data to test the effectiveness of design interventions in terms of environmental psychology improvements.

2. Motivating sustainable behaviors and fostering common building knowledge

How do we make the intangible and environmentally harmful consequences of behavior tangible for building occupants? Simultaneously, can we empower building occupants with knowledge about urban ecological systems? This research and application of feedback mechanisms helps develop common understandings of the built world, easing engagement between building professional “experts” and “nonexpert” occupants.

3. Post-renovation environmental psychology & design conditions

After using the baseline environmental psychology research to inform design interventions, research will then be needed to determine the effectiveness of these design interventions in terms of occupant psychology. Have these design features altered occupant mood, behavior, and performance/productivity? Is the space more flexible and conducive to interdisciplinary collaboration and innovation? Have the intentions of the designers been translated into reality and experienced in the same way by users?

Pedagogy: transdisciplinary sustainable preservation research & seminar

Description

Interdisciplinary research is difficult because of a lack of formal university infrastructure conducive to this kind of collaboration and disciplinary perspectives and worldviews are often difficult to reconcile. However, there is wide consensus that interdisciplinary collaboration and reconciliation is needed to confront “real world” problems. Many faculty members have identified opportunities for students in their existing classes to contribute to BattleLab research, and this project will establish a formal framework for interdisciplinary research and discussion in the form of an annual, for-credit university class. The director of the School of Architecture graduate program in Historic Preservation will be the primary class instructor, but the class will draw on a larger working group of cross-campus faculty to guide a wide array of student research engaged around the Battle Hall and West Mall sustainable...
preservation project. The data that students collect will be stored in the BattleLab repository system so that with each new year, the BattleLab students (as well as faculty) can build off past research and directly contribute to on-campus sustainable change. While other classes may use elements of the Battle Hall and West Mall site as a case study, this class will be available to any student who may have questions and research on BTL, WMB, or a potential design intervention for these buildings.

Conclusion

The BattleLab project aims to establish parameters for an action research inquiry with an existing and a historic building on The University of Texas at Austin campus. The project will take a "living lab" approach, where students, faculty, and staff across campus engage directly with a legacy building and iteratively experiment for sustainable outcomes and to enhance cross-disciplinary education and discourse. Through integrating all of these perspectives – Ecology, Energy, Materials, Human agency, Pedagogy – in a design process, BattleLab will show how campus buildings can become active sites for research, connection, collaboration, and innovation in the effort to address sustainability challenges.

References


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