NARRATIVES FROM PRACTICE: TOWARD CARBON NEUTRALITY

Alison G. Kwok, PhD, AIA, LEED AP University of Oregon

Nicholas Rajkovich, AIA, LEED AP University of Michigan

The 2007-2009 AIA Upjohn Research Initiative project, entitled Case Studies of Carbon Neutrality, addressed the impact of buildings on climate change, the American Institute of Architects' (AIA) adoption of the 2030 Challenge, and the AIA's Case Study Initiative. The project, led by the University of Oregon, developed narratives from project teams on the design and delivery process for carbon neutral buildings of six west coast projects: Orinda City Hall, Chartwell School, Tillamook Forest Center, Stephen Epler Hall, The Gerding Theater, and East Portland Community Center. Each narrative described the design intent, construction, and processes to operate the building.

This paper describes the themes and lessons learned from the social interactions and communications between design team members, specifically investigating the relationship between architect and engineer. Methodologies utilized in the research included video interviews, transcriptions, and narrative development. In 2009, after completing the narratives for the AIA, the University of Oregon leveraged additional funding from the U.S. Green Building Council to develop an expanded set of case study narratives. These expanded narratives included the owner, contractor, key consultants, and facility manager in addition to the architect and engineer. In early 2010, the USGBC case study narratives will be used in instructor-led classes and other educational initiatives. It is anticipated that practitioners will be able to apply lessons learned from these narratives to develop and improve successful integrated practices. At the University of Oregon, lessons learned from the narratives will be used in classes to frame new constructs of integrated practice.

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Introduction

In 2006, recognizing the impact of buildings on global climate, the American Institute of Architects adopted the 2030 Challenge — an initiative to reduce the building sector's dependence on fossil fuels and mitigate greenhouse gas emissions. The AIA also initiated a program (2001) to develop case studies of recently completed and ongoing projects.¹ The case study initiative was intended to expose students to specific issues of professional practice, and simultaneously provide opportunities for practitioners to reflect on their design approach for their next project.

The Case Studies of Carbon Neutrality project, awarded a 2007 AIA Upjohn Research Initiative grant, addressed both AIA initiatives, related to domains of architectural knowledge, design, and building performance, strengthened research links between academia and practice, and addressed the goals of the 2030 Challenge. The Case Studies of Carbon Neutrality project cataloged the design and delivery process for carbon neutral buildings through a series of six case studies of west coast buildings that describe design intent and performance through interview-narratives with design team members.

	Chartwell School Seaside, CA	Orinda City Hall Orinda, CA	Portland State Univ. Stephen Epler Hall Portland, OR	Tillamook Forest Center Tillamook, OR	The Gerding Theater Portland, OR	East Portland Community Center Portland, OR
Information	21,000 s.f.; completed 2006 Predicted 50% below code Measured EUI 27.9 kBtu/sf/year	13,900 s.f.; completed 2007 Predicted 72% below code Modeled EUI: 59.6 kBtu/sf/year	64,400 s.f.; completed 2003 Predicted 49% below code Measured EUI: 41 kBtu/sf/year	18,800 s.f.; completed 2006 Predicted 30% below code Measured EUI: 99 kBtu/sf/year	55,000 s.f.; completed 2006 Predicted 35% below code Measured EUI: 61 kBtu/sf/year	22,000 s.f.; completed 2008 Predicted and measured data not available
Architect	Scott Shell EHDD Architecture San Francisco, CA	Henry Siegel Burton Peek Edwards Siegel & Strain Architects Emeryville, CA	Ron Van der Veen Roger Gula Steve McDonald Mithūn Architects Seattle, Washington	Robert Hull Teresa Russell Miller Hull Partnership Seattle, Washington	Craig Mendenhall GBD Architects Portland, OR	Lisa Petterson Eric Ridenour SERA Architects Portland, OR
Engineer	Allan Daly Taylor Engineering Alameda, CA	Gwelyn Paliaga Taylor Engineering Alameda, CA	Mark Heizer Interface Engineering Portland, OR	Paul Schwer Conrad Brown PAE Consulting Engineers Portland, OR	Bob Schroeder Glumac Engineers Portland, OR	Mark Heizer Interface Engineering Portland, OR

Table 1: Projects Investigated for Study

This paper begins to draw themes and lessons learned from the social interactions and communications between design team members. The case studies not only highlight the quality of the firm's work, but provide a chance for practitioners to reflect on their unique approaches to the project. The analysis in this paper is hoped to help advance the discipline of architecture by capturing the commonalities of knowledge, experience, and expertise in an effort to reduce the building industry's dependence on fossil fuels and to mitigate green house gas emissions, which the AIA adopted in 2006.

Methods used in this project were later expanded and applied to another case study project funded by the U.S. Green Building Council (USGBC) and to an advanced technology seminar taught at the University of Oregon with the intention of increasing the confluence between practitioners and the academy in terms of research skills and investigations and to provide enhanced curriculum. The paper is divided into five parts: 1) project specifics and selection criteria; 2) methodology used to collect information; 3) analysis of themes; 4) dissemination examples and arenas; 5) outcomes and uses beyond this project.

Project Specifics and Selection Criteria

To catalog the design and delivery process for carbonneutral buildings, our team² defined the project selection criteria by which the design firms would choose their projects (Table 1): a project had to have been in operation for at least one year and met the Commercial Buildings Energy Consumption Survey (CBECS) energy consumption performance standard of 50 percent of the regional (or country) average for that building type.³ Six firms in San Francisco, California, Seattle, Washington, and Portland, Oregon included: EHDD Architecture, Siegel & Strain Architects, Miller Hull Partnership, Mithūn, GBD Architects, and SERA Architects.

In a recently funded project with the USGBC, four projects were selected for case study narratives and in addition to the architect and engineer, the methodology expanded to include the owner, contractor, key consultants, and facility or operations manager. These projects included: Kenyon House, Seattle, Washington, Liberty Centre, Portland, Oregon; Potomac Yard, Arlington, Virginia; and Arizona State University's Biodesign Institute, Phoenix, Arizona.

Research Methodology

Once the firms were invited and projects were selected, in-person interviews with the project architect and engineers took place at the firm's office or in some cases, when it was not possible to travel, by phone.

Interview Protocol: Interview questions were developed to encourage discussion and conversation on a series of topics: team building, goal setting, technology, process, management and relationships, barriers, and future work. The interviews were recorded so that the interviewers could focus on the discussion rather than on note-taking. The interviewees were encouraged to not use any drawings or handouts in the interview, but to focus on the verbal narrative. The interviews took approximately one hour each.

Equipment and Supplies: Olympus DS-40 Digital Voice Recorder, ME30W Stereo Microphone, AS-2400 Footswitch, video camera, 4 large-screen monitors for video editing, headset, software, cases for cameras and equipment, and half-size drawing sets and specifications for case study buildings.

Interview Transcription: The audio files were transcribed by graduate students at the University of Oregon. Each recorded interview took approximately 5-6 hours to transcribe. Transcription editing and narrative development for each interview took approximately 10 hours to complete. Drafts of the narratives were sent to the architects and engineers to review for accuracy and editing; once returned, incorporation of revisions, further editing, and formatting took approximately 15-20 hours to complete. Building Visits: Building visits or a walk-throughs were conducted with the facilities manager. The interview questions developed for the architects and engineers were adapted for the building managers, but related to the same general topics or themes described above. Additional questions were asked about issues discovered during the walk-through. Notes, observations, sketches, and photographs were taken throughout the visits. Though we initially planned to include the transcriptions and edits from the projects in the final document, our budget did not allow for the transcription and editing of this information for the final narrative.

Narrative Development: A template for the narratives was arranged to include a cover page with building information (introduction, awards received, and sidebar information for weather information, square footage, cost, predicted and measured energy use); two narratives (architect, engineer); and an exhibit section including several project images. The intent of the template was to organize the information similar in layout to the cases used in schools of business.

Evidenced-based Research: From the narratives produced in this project, we are currently working on a series of analyses that will describe the relationships established between their design teams to accomplish project goals. The results of such an evaluation will assist firms in a better understanding of the areas of success and needed improvement to the design process, construction, and operations of future projects.

Analysis

Closing the loop on the design process offers practitioners a chance to consider the lessons learned from post-occupancy evaluation of completed buildings. Looking for common themes within the discourses of each narrative would reveal shared values, philosophies about design and process, and activities of project teams as they progressed through the various phases of design to complete these notable projects. Five areas characterize the social interactions present in the design process between team members for each project: starting point, descriptors, experimentation, follow-up, and education/training.

Starting point: almost every project team member described the necessity of coming together at the start of each project via a sustainability charrette or through the contractor's risk agreement process, where the actual design does not start until the entire team has come together. And, there must be a commitment on the part of the owner, architect, and engineer to develop sustainability criteria.

Descriptors: the architects and engineers on the project spoke highly of each other using adjectives such as: "collaboration", "trust", "listening", "experience working together," and "previous successful working relationships." Experimentation: at several points in the design process, particularly when a new technology is introduced, there is a willingness to persevere, to experiment, to take a risk, because it will get a needed point on the LEED checklist or it will enhance the project's success (perceived or actual). Example: at Stephen Epler Hall, there was resistance from the maintenance crews of the dorm about the new low-flow water closets. They were simply not convinced that it would save money in the long run, despite high repair costs when the toilets would get clogged. At that point, the design team ordered one to be installed for the facility managers to use on site. They were convinced by their function and are now used in the building.

Follow-up: the architect-engineer design teams continue to work with the facility managers to improve efficiencies well after the building has been completed. At Chartwell School, energy bills were running higher than anticipated by the building simulation model. EHDD Architects and Taylor Engineering worked with the executive director of the school to find and treat the cause of the energy inefficiencies.

Education and Training: once the project is completed, teams emphasized the importance of education/training programs for building occupants and facility managers in creating a successful project. At Orinda City Hall, for example, signs light up to indicate to the occupants when it is permissible to open the windows. Kwok • Rajkovich

Dissemination Examples and Arenas

The project narratives are posted to the AIA Knowledge Community website, the Society of Building Science Educator's (SBSE) Listserv, displayed on firm websites, and presented at the 2008 Behavior, Energy, & Climate Change (BECC) Conference in Sacramento.

Project narratives were also used in a two-credit graduate seminar at the University of Oregon to discuss themes and commonalities and professional practice. The assignment required students to conduct interviews with local practitioners, develop narratives, and analyze themes.

Beyond This Project

The AIA Upjohn Research Initiative (2007-2009) helped to leverage further funding to develop a case study roadmap and prototypical case studies and protocols for the USBGC. The case study narratives serve as a valuable resource for architects and the protocols developed will serve as a guide for future research of this type. Closing the loop in the design process offers practitioners a chance to consider lessons learned from project communications and dynamics to improve their firms; these lessons in turn provide material to strengthen connections between academia and professional practice. Narratives from Practice: Toward Carbon Neutrality

- ¹ AIA Case Studies Initiative, see http://www.aia.org/education/ AIAS075232 (accessed 12/6/2009)
- ² AIA Upjohn team comprised of: Alison G. Kwok, Principal Investigator; Nick Rajkovich, AIA, LEED AP, Pacific Gas and Electric, co-PI; Britni Jessup, LEED AP, principal graduate research fellow.
- ³ The 2030 Challenge, see http://architecture2030.org/2030_challenge/ published date from the Energy Information Agency (EIA)