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Blurring Boundaries in the Theory and Practice of Sustainable Building Design

Raymond J Cole[a,*] & Daniel Pearl [b]

[a,*] School of Architecture and Landscape Architecture, University of British Columbia, 6333, Memorial Road, Vancouver, BC Canada, V6T 1Z2

[b] École d'architecture, Faculté de l'aménagement, Université de Montréal, C.P. 6128, Succursale Centre-ville, Montréal, Québec, Canada, H3C 3J7

ABSTRACT

The notion of "boundaries" is critical when discussing buildings and sustainability - both technically and professionally, and in the current separation of ecological from social and cultural considerations in building design given that they both play a critical economic role throughout the lifetime of a development.

This paper examines the ways that the notion of "bounding" has proved both valuable and problematic in building environmental research and practice. More significantly, the paper explores the consequences of "blurring" boundaries and the consequences for future advances in the discussion of designing and assessing buildings, projects and communities that support sustainable patterns of living. The paper uses three key distinct realms within the current environmental debate where boundaries play a decisive role:

- The conceptual boundary that defines the scope and structure of building assessment methods.
- The professional boundaries that define the realms of knowledge and responsibility of members of the building design team.
- The designation of distinct building environmental strategies that are capable of being assessed and evaluated within the more blurred realm of social and cultural values and economics.

Key Words: Sustainable building, boundaries, assessment methods, professional responsibilities

1 INTRODUCTION

Picon (2005:10) identifies three traits evident in the papers presented at the Association of Architectural Historians' 2005 Conference: *Rethinking the Boundaries: Architecture Across Space, Time and Disciplines.* Firstly, an "affirmation of the decisive importance of the notion of boundary, in all of its forms, in thinking both architectural and urban objects…"; secondly, the "need to interrogate and even throw into crisis the borders, limits, and lines of demarcation that we have inherited, sometimes unconsciously."; and thirdly, that as soon as boundaries are "closely examined, they rapidly blur; they fall apart, giving birth to a multitude of traces for which one is tempted to invoke all sorts of images and metaphors borrowed from mathematics, from physics, and from philosophy…".

The notion of boundaries can be interpreted in a variety of ways in the context of environmental issues, be-it in terms of where conflicting conceptual ideas meet, or at the interface between different ecosystems. In ecological context, for example, Van der Ryn, (2005:151) identifies that: "[t]hose places where two kinds of natural systems come together – for example, where forest meets grassland or where tidal waters meet land – are called ecotones and they are typically places of maximum biological diversity and productivity." This suggests that the realm that separates entities is as important as the entities themselves. In all cases, the boundaries of limits of a system are entirely dependent on the "observer's viewpoint in defining the purpose and activities of the system (Williamson, 2002:82).

Boundaries are of equal consequence when discussing buildings and sustainability - both technically and professionally, and in the current separation of ecological from social considerations in building design given that they both play a critical economic role throughout the lifetime of a development. To date, contemporary designers have argued that additional time and fees are required to ensure higher quality buildings and its resulting urban fabric, and now the same request is being made to ameliorate a project's environmental impact.

Boundaries and their blurring must be envisioned differently with respect to different realms of enquiry and practice. The blurring of social, ethical and cultural boundaries, for example, will be wholly different in the overall advancement of evaluation tools that address environmental and ecological questions. The idea of breaking down or blurring boundaries in the way that environmental and ecological issues are viewed and accommodated in buildings is necessary to expose positive synergies. By contrast, it may be necessary to seek greater clarity and precision in addressing social, ethical and cultural factors to firm up support for them by way of closing loops / integrating soft

subjects with economic ones (i.e., grounding resident empowerment issues with continual economic health and growth instead of isolated initial efforts being left to "run by themselves").

The objective of this paper is to examine the ways that the notion of "bounding" has proved both valuable and problematic in building environmental research and practice. More significantly, the paper explores the consequences of "blurring" boundaries and the consequences for future advances in the discussion of designing and assessing buildings, projects and communities that support sustainable patterns of living. The paper uses three key distinct realms within the current environmental debate where boundaries play a decisive role:

- The conceptual boundary that defines the scope and structure of building assessment methods.
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- The designation of distinct building environmental strategies that are capable of being assessed and evaluated within the more blurred realm of social and cultural values and economics.

2 BOUNDARIES IN BUILDING ENVIRONMENTAL ASSESSMENT METHODS

Few would deny that wider development and application of building environmental assessment methods has provided considerable theoretical and practical experience on their potential contribution in furthering environmentally responsible building practices. While their most significant early contribution was to acknowledge and institutionalize the importance of assessing building across a broad range of considerations, the increased use of building environmental assessment methods has began to expose and clarify a host of new potential roles (Cole, 2006). They were initially conceived, and still largely function, as voluntary, market place mechanisms by which owners striving for improved performance would have a credible and objective basis for communicating their efforts. Within this context, ensuring that the methods were simple, practical yet accurate and inexpensive in both use and maintenance was deemed paramount (Cole, 2005).

The notion of boundaries is evidenced in current building environmental assessment methods in the following aspects: Scope, Structure, and Overall System Design:

- *Scope:* What is included within an assessment method both defines and bounds

their scope and emphasis. Most current assessment methods typically:

- Only evaluate “green” performance.
- Emphasize the assessment of resource use, ecological loadings, health and comfort in individual buildings, and include primarily quantitative performance criteria.
- Are technically framed and typically only address performance issues that can be easily quantified.
- Assess environmental performance relative to explicitly declared or implicit benchmarks – usually typical practice – and, as such, measure the extent of improvement rather than proximity to a defined, desired goal.
- Are primarily concerned with mitigation – reducing stresses on natural systems by improving the environmental performance of buildings.
- Rarely, if at all, explicitly pose larger societal questions such as, whether the “project” is needed in the first place.
- Rarely, and if so modestly, explicitly address medium and long-term issues and their ramifications.

- *Structure:* The way that performance criteria are organized within an assessment method itself becomes instructive in communicating environmental issues and can permit or limit the kind of interpretations that users can place on the results to formulate appropriate strategies:
  - The performance issues are typically organized in some fashion, e.g., the US Green Building Council’s *Leadership in Energy and Environmental Design* (LEED™) rating system organizes criteria into five categories and relies on simple addition of points attained to derive the overall performance rating. The Japanese *Comprehensive Assessment System for Building Environmental Efficiency* (CASBEE), by contrast separates those performance issues related to Quality from those dealing with Resource Use and Loadings, and uses the quotient between them to define overall performance.
  - The individual performance criteria are presented discretely. While this avoids issues of “double-counting” in deriving a performance score, it also limits consideration of synergistic relationships (and dissuades IDP efforts).

- *Overall System Design:* While considerable current debate focuses on the scope and structure of assessment methods, the design of the overall system within

which they sit is of equal consequence:

- While the framing of assessment methods is clearly broadening, most assessment tools still focus on individual buildings. It is increasingly understood that single tools cannot be expected to serve all the different conditions and requirements needed to infuse sustainability considerations into the market.
- Life-cycle assessment tools currently exist alongside building environmental assessment methods and a recurring debate is how and to what extent the former might be more integral to the latter.
- The aggregate affect of individual buildings has enormous consequence for community infrastructure design and operation. This, together with the inherent limitation of analyzing individual buildings as the basis to understand ecological impacts, has generated interest in creating and linking assessment methods and tools across a variety of scales.
- While both the breadth and the time frame have increased, future tools are likely to link across varying scales – building, neighborhood, city, region, etc. – to permit the comprehensive framing of sustainability assessment.
- The range of building types seeking certification is increasing and this, in turn, is creating the need either to develop generic systems that can recognize distinctions on an as-needed basis for specific situations, or to create a suite of related methods and tools, each of which uniquely addresses a particular building type.

So, while building environmental assessment tools were initially conceived to provide a distinct role, their scope and application are increasingly being expanded. A priority in the early generation environmental assessment tools' was to engage industry and ensure their widespread adoption. Today these same assessment tools must accommodate the larger scale issues of communal impact and climate change. This expansion and the attendant redefining of boundaries brings a host of new opportunities that should legitimately shape the next generation of tools.

3 BOUNDARIES IN PROFESSIONAL PRACTICE

Building environmental assessment methods have provided definitions of "green building" and associated best practice. But change occurs through the use of such tools, raising a host of questions regarding the demands they make, the challenging of norms,

the acquisition of new knowledge and skills and, more broadly, how they affect the culture of all those responsible for delivering buildings.

3.1 Dialogue and Communication

Architects view buildings differently than do engineers, developers or users, and these differences and associated priorities will probably always exist. Accepting the limitations of generalization, there is a shared culture within the various design professions – a set of unique traits shared by their respective members. Indeed, the evolution of the design professions has been manifest in the forming and defending of these "cultural" borders or boundaries to guard their political power, professional responsibilities and privileges.

But since the range of environmental considerations covers all professions associated with the design of buildings, design professionals must now understand performance issues beyond their immediate responsibilities. An important role of assessment methods has been in enhancing the dialogue between the various members of design teams and establishing common ground. An emerging issue is whether assessment tools can be used to negotiate the different expectations and viewpoints of a larger and broader group of stakeholders, from financial institutions, through policy and regulatory agents, to user groups. This is not simply a task of forging a "common language," but a means of navigating through fundamentally different positions and priorities while still being respectful of individual points of view.

Encouraging established designer professionals to integrate "sustainability thinking" within their projects will require assurances that assessment methods be simple and transparent in use and complementary to other tools and processes.

3.2 Integrated Design Process

The *Integrated Design Process* (IDP) is increasingly recognized as essential in achieving high performance buildings without significant incremental cost. In contrast to traditional design process that is characterized as having a linear and often adversarial relationship between participating consultants, it is increasingly being recognized that:

- Open and continuous lines of communication are essential throughout the entire process – both during and in between team.
- Transparent methods of communication are necessary to build trust and give participants a greater sense of ownership over the process, reduce conflicts, and allow the project to benefit from each individual team member's unique contribution.

While a traditional design process would likely involve team members (beyond the principal designer) only when essential, the nature of IDP is inclusive from the outset. Although the team composition might vary, especially when moving from design to construction and from construction to occupancy, the “team” concept remains a key element of the process. The team members, at any given time, are those individuals who can influence the performance of the building and the IDP creates an activity that the different design cultures can co-inhabit on more equal terms. Fundamental to this process is, therefore, the redefining of the cultural boundaries that have historically defined, and been defended by, the individual design professions. Convincing designers that blurring the conventional “design process” and how and by whom it is controlled can enable both high quality design and high environmental building performance, is key to widespread adoption of IDP.

Currently available software packages can, with reasonable ease and accuracy, calculate/evaluate environmental performance of a particular design iteration and can be a valuable basis for learning by trial and error. However, by emphasizing a series of isolated results that are not easily transparent and by side-stepping the need to fully understand complete system performance, their use may diminish the extent to which decisions are ultimately prioritized through synthetic thinking. In the end, such tools may edit out a critical and necessary dialogue between the designer and potential consultants. They cannot replace inter-disciplinary collective thinking.

4 BOUNDARIES IN SUSTAINABILITY

4.1 Accepting and Adopting Complexity

A general characteristic of the building industry is that it is risk averse and prefers simple, unambiguous messages regarding what to do rather than why it should be done. The success of the current generation of building environmental assessment methods lies in their perceived simplicity in declaring an industry expectation of what constitutes “green” building design and construction. Solutions to complex environmental problems that involve a wide range of scales of influence and time frames requires systems thinking – the ability to appreciate and address linkages and inter-relationships between a broad range of often conflicting requirements. Gladwin, Newberry and Reiskin (1997) suggest that wholes need to be emphasized over constituent parts, relationships over specific entities, processes and transformations over physical structure, quality over quantity and inclusiveness over exclusiveness. These are not the underpinnings of most current building environmental assessment methods and are not easily superimposed

on them.

A key issue here is the accuracy with which the performance requirements of the individual credits within assessment methods are both defined and accessed. Generally speaking, as the accuracy within the assessment components increases, the overall potential innovation related to creating complementary synergies are diminished.

4.2 Reconciling Anticipated and Real Outcomes

All building projects operate within a prevailing political climate and context that can profoundly influence the rate and extent of environmental progress. For example, over 300 Mayors, representing more than 50 million Americans, have signed the *U.S. Mayor's Climate Protection Agreement.* Under the Agreement, participating cities commit to take actions that include urging their state governments, and the federal government, to enact policies and programs to meet or beat the greenhouse gas emission reduction target suggested for the United States in the Kyoto Protocol - 7% reduction from 1990 levels by 2012, and urging the U.S. Congress to pass the bipartisan greenhouse gas reduction legislation, which would establish a national emission trading system. Although policy-makers typically demand accountability and short-term results dictated by political timetables and interests, the primary effects – both positive and negative – only surface years after their completion. The link between achieved building environmental performance and political intent or, more specifically, between achieved performance and stated goals thus assumes considerable importance.

Current building environmental assessment tools cannot evaluate a building's "real" environmental impact, to the point of being able to fully quantify the environmental impact associated with current or revised environmental policy. Since most current evaluation tools are not connected to evidence-based data it is dangerous to promote them beyond their designed intention.

4.3 Expanding Scope

Having accepted the challenge of comprehensive environmental assessment, it seems necessary to follow this through to its logical conclusion and create frameworks that explicitly accommodate temporal and spatial dimensions within which performance issues and stakeholder interests can be appropriately positioned. Expanding the scope of assessment may not, however, necessarily translate into greater overall complexity.

If a primary goal of evaluation tools is to encourage the most "comprehensive notion of sustainability", then it is clearly necessary to expand the scope of issues being

addressed in current assessment tools - be it process, medium and long term ramifications and communal participation.

The more comprehensive bounding will identify issues deserving greatest attention and permit more informed judgements to be made regarding the accuracy needed to evaluate them. More importantly, perhaps, it will help identify the range, type, and combinations of tools and mechanisms needed to create positive change (Cole, 2006).

4.4 Linking Regulatory & Voluntary Mechanisms

Although profound changes in buildings and human settlement patterns are unlikely until there is a fundamental shift in societal values and expectations, two mechanisms for improving building performance are regulation and voluntary market-based programs. Environmental standards and regulations usually only define a minimally acceptable level of performance and are not, therefore, normally a vehicle for encouraging high levels of performance. Voluntary building environmental assessment and labeling programs have the primary objective of stimulating market demand for buildings with improved environmental performance and are considered one of the most potent and effective means to both improve the performance of buildings and promote higher expectations and demand. However, to fully engage mainstream building design and construction practices as we move forward over the next decade, it will become increasingly important and necessary to understand and establish the complementary relationship between regulatory and voluntary mechanisms for improving building environmental performance.

The blurring of voluntary-based tools and regulatory mechanisms is beginning to unfold in the United States:

- The U.S. Green Building Council (USGBC) signed a Memorandum of Understanding with the Clinton Climate Initiative (CCI) on August 7, 2006, to engage the largest cities in the world through the Large Cities Climate Leadership Group. USGBC will provide these cities with the tools to become leaders in energy efficiency and green building strategies, which will result in the reduction of carbon emissions.
- Washington, D.C., is poised to become the first U.S. city to mandate sustainability guidelines for privately owned real estate. The D.C. City Council passed *The Green Building Act of 2006* on December 5 2006, calling for all new development in the city to conform to the U.S. Green Building Council's LEED™ standard beginning in 2008 for publicly financed buildings and 2012 for private construction (DC, 2007).

Robinson identifies that "…sustainability is necessarily a political act, not a scientific concept" (p382) and, as such, brings to the fore a shift in the historic division between public and private sector mechanisms. This will be increasingly evidenced with the shift from green building practices to those that embrace a wider range of sustainability considerations.

4.5 Reconciliation of Environmental, Social & Economic

The growing awareness of environmental degradation has become increasingly institutionalized in building design in the form of environmental assessment methods. But, given the current legal constraints that define ownership and site boundaries, environmental performance has led to autonomy or self-reliance becoming an overall goal, whether explicitly or implicitly.

Bringing broader social and economic considerations into the mix creates a wider range of consideration into any negotiation. Negotiation literature typically focuses on trade-offs of interests among parties who are already in agreement on the basic nature of the dispute and seldom explicitly challenge the underlying values. Robinson (2004:380) suggests that the "need to develop methods of deliberation and decision-making that actively engage the relevant interests" of stakeholders will become increasingly important to infuse sustainability considerations into day-to-day conduct and practice. Given the current multiplicity of conflicting views, he further suggests that the 'power' of sustainability lies "precisely in the degree to which it brings to the surface these contradictions and provides a kind of discursive playing field in which they can be debated" (p382) and subsequently encourage the "development of new modes of public consultation and involvement intending multiple views to be expressed and debated." A key implication here is that, contrary to academic tradition, a loose definition of sustainability is perhaps more useful than a precise one since it permits a place of negotiation between widely different views to unfold.

4.6 Closing Loops

The way that building environmental assessment methods identifies discrete performance requirements often translates into design as a series of isolated gestures rather than encouraging "closing the loops" and responding appropriately to physical and social contexts locally. This debate is about enabling social, contextual and cultural confluences to be privileged ahead of individual actions, where the whole is far more potent and instructive.

5 CONCLUSIONS

Boundaries, whether implicit or explicit, are both useful and constraining in the ways that environmental issues are considered in research and practice. Clear demarcation of a problem or scope of work permits clarity in definition and responsibilities. However, the increasing acknowledgment of sustainability as an overriding requirement and the associated shift toward systems thinking has placed greater emphasis on understanding links and synergies between constituent elements of systems as much as the elements themselves. The process still holds significant influence (IDP as one approach) and its importance must somehow be encouraged and accommodated.

If the boundaries of traditional realms of knowledge and professional responsibility are blurred, then a host of new possibilities and questions emerge in the use and role of evaluation tools and professional practice: How, for example, can it be ensured that evaluation tools are still encouraging innovation and progress in the face of current global challenges? When must the closing of loops and cycles be encouraged ahead of the deepening of individual technological inclusions? At what point does the technical complexity of an innovation surpass an acceptable maintenance and operational burden for its users to manage and appropriate? When and how can grass roots efforts by motivated community-driven volunteers meet up with municipal policy guidelines? To what extent should future iterations of evaluation tools attempt to enable this union?

If the requirements of sustainability are to enter the vocabulary and methodologies of building assessment, then it would seem appropriate to not only to accept the accompanying “messiness” – but to embrace it.

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