

LEED and Integrated Design

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Figure 1: Sidwell Friends Middle School, a LEED Platinum rated building by Kieran Timberlake Associates

Introduction

Like the human body, a building is a system—comprised of an exquisitely interconnected series of sub-systems that together function as a high performance machine. Moreover, like humans, buildings exist in context. Contexts span from local/site to watershed to eco-regional to global. As humans represent an increasingly defining presence on the planet, interdependencies between building, ecosystem and people are increasingly pronounced. A third salient consideration is life cycle. From source through manufacture, use, and ‘re-source’, a building represents a continuum of inputs and outputs. These foundational constructs—building as system, buildings in contexts, and buildings through the life cycle—are the bases for integrative design: a process that, more than optimizing a single sub-system, optimizes the system as a whole, cognizant of contexts and distinct, interconnected life cycle phases.

From theory to action

An integrative design process engages a broad spectrum of project stakeholders in a collaborative team beginning at the early planning and design stages.¹ Architect Bill Reed offers the maxim “early, everyone, everything” as a mental touchstone. “Front-loading” the design process recognizes the complexity of

the inter-related systems. Allocating more time to gain consensus around guiding principles, critical success factors and metrics early in the process can streamline decision making through the balance of the design. These foundational parameters are often accomplished through one or more ‘charrettes’, derived from the French word for cart: At the Ecole des Beaux Arts in Paris in the 19th century, faculty would use carts to collect students’ final drawings. Students were known to jump into the carts to finish their work at a frenetic pace. The Charrette Center offers a contemporary definition: “...a brief but intense design workshop in which stakeholders and interested citizens are invited to contribute to the work of an interdisciplinary team...during the earliest stages of design and planning.”²

Creating a strong ‘team’ vs. the more conventional organizational structure (e.g., architects, engineers, landscape architects, interior designers focused on specific vs. interrelated disciplines) leads to collaborative, coordinated work towards a shared, coherent outcome. A structural engineer can help design a structure that is elegant and efficient according to spatial requirements determined by the architect. A mechanical engineer can suggest alternate mechanical systems that might involve special space requirements that can be incorporated by the architect early on. Civil engineers and landscape architects can suggest siting strategies that will result in balancing the building’s

water demand with on-site water resources, and create a horticultural-based stormwater management system. Interior designers can specify finishes that will ensure healthful indoor air quality. A contractor can evaluate the constructability of the design and contain first costs, while a facility manager can assess operability and maintainability and associated life cycle costs. Local citizens can offer knowledge of place and ensure that the public good and social equity concerns are respected. The overriding goal is to make well-informed, confident decisions and establish measurable goals and guiding principles early. Together, these guide decisions through building occupancy, and later inform the day-to-day decisions of people responsible for building operations and maintenance.

These common reference points, co-created and collectively owned by the team, are particularly important as projects are pulled to meet intractable schedule and budget parameters. Front-loading the process and establishing measurable goals—with the team establishing the project's salient definitional measures—is key to differentiate wants from needs, especially during value engineering. For example, if daylighting is one of a project's critical success factors—a need—then the integrative design process should support this through a concomitant reduction in mechanical system sizing, a high performance direct/indirect lighting scheme, lighting controls equipped with daylight and occupancy sensors, high albedo materials and light shelves to bounce light deep into the floor plan. Successful daylighting design is indeed an integrated system affecting many building assemblies, systems and materials. This continuum of integrative thinking through the building life cycle is an essential element of green building.

Measuring performance

The U.S. Green Building Council's LEED® (Leadership in Energy and Environmental Design) is a voluntary, consensus-based, market-driven third party green building rating system, initially launched in 2000. For many projects pursuing integrative, sustainable design, LEED offers a useful metric to track performance and provides for independent third-party certification, verifying that what were intended performance outcomes were achieved. LEED is organized in six categories (from LEED 2009, Building Design and Construction):

- Sustainable Sites
- Water Efficiency
- Energy + Atmosphere
- Materials + Resources
- Indoor Environmental Quality
- Innovation in Design/Operations

- **Regional Priority**

LEED 2009, released in April 2009, evolves the basic LEED structure by introducing weightings, based on direct environmental and human benefits, and regional-based credits to emphasize bioregional diversity based on project location. To date, more than 23,000 TK projects are LEED registered, with more than 2,400 TK having achieved LEED certification. In addition, more than 114,000 people have achieved the LEED Accredited Professional credential. As of January 2009, LEED registration, certification, and professional credentialing are administered through the Green Building Certification Institute (GBCI).

The LEED 'family' of rating systems corresponds to specific building sectors and phases, as follows:

- LEED For New Construction
- LEED For Homes
- LEED For Commercial Interiors
- LEED For Core and Shell
- LEED For Schools
- LEED For Retail
- LEED For Existing Buildings/Operations + Maintenance
- LEED for Neighborhood Development (in pilot)
- LEED For Healthcare (in development)

For LEED 2009, each rating system is based on a 100-point scale, with certification levels (Certified, Silver, Gold, Platinum) representing achievement of all prerequisites and varying number of optional points that vary depending on the specific credit achieved. Ten bonus points are available for innovation in design, exemplary performance, or regional significance. Rating systems are comprised of common prerequisites and credits, and others that are customized to reflect a specific building sector or phase. For example, LEED for Existing Buildings/Operations and Maintenance, offers credits for Integrated Pest Management, Erosion Control and Landscape Management Plan and Alternative Commuting Transportation in the Sustainable Sites category.

LEED development process

The LEED Rating System uses an open, consensus-based process to develop and evolve its content, aligned with ANSI (American National Standards Institute) requirements. Specific, volunteer committees are formed of diverse groups of practitioners and experts representing a cross-section of the building and construction industry for each rating system. These committees prepare credits based on their specialized knowledge and

research in their fields. Product development committees are augmented with USGBC's technical advisory groups (TAGs) to ensure technical consistency and rigor. The LEED development process includes a pilot phase, public comments on draft rating systems (usually two rounds), and final balloting by USGBC members prior to launch. These steps provide for a transparent, consensus-based process, and allow for a broad spectrum of views to be considered. Beginning with LEED 2009, USGBC has established a standardized continuous improvement development cycle to provide a higher level of predictability associated with revisions. This is similar to revision schedules adopted by other standards-setting bodies, such as ASHRAE.

The value of integrative design

Just as Marshall McLuhan proclaimed "...the medium is the message", for design, process defines product. Analyses of the business case for green buildings consistently point to an integrative design process, initiated early in planning and design and involving multiple stakeholders, as a significant contributor element for projects to meet budget and schedule. If the project team affirms sustainability as an overarching project goal with specific measures and, importantly, the owner stands behind that intention, then establishing a process that delivers on Bill Reed's maxim "early, everyone, everything" is requisite.

Conclusion

While change is hard for humans, changing the design process to deliver successful, high performance, elegant green buildings is a 21st century imperative. City, county, state, and federal governments are increasingly requiring LEED certified or certifiable buildings (or equivalent) for their publicly-funded buildings; some are extending the requirement to privately-funded projects. Similarly, scores of corporations, production homebuilders, housing authorities and developers are doing the same. Acknowledging the value of the integrative design process to achieve these requirements and realize aspirations is a mark of prudent stewardship of our collective assets, including financial, natural, public health and social. Integrative design is a pre-text for a built environment consistent with broader civic, social and ecological value.

Notes

1. Don Prowler, "The Role of Buildings and the Case for Whole Building Design," Whole Building Design Guide, http://www.wbdg.org/wbdg_approach.php (Accessed November 2008).

2. Accessed 6/30/09 <http://www.charrette-center.com/newlongview/newlongview.asp?a=spf&pfk=1&gk=7>

Figures

Figure 1: BaryHalkin, "Sidwell Friends Middle School" AIA Top Ten, <http://www.iaatopten.org/hpb/overview.cfm?ProjectID=775>

Biography

Gail Vittori is Co-Director of the Center for Maximum Potential Building Systems, a non-profit sustainable planning and design firm established in 1975. She is Chair of the U.S. Green Building Council's Board of Directors, the convener and a Co-Coordinator of the Green Guide for Health Care and Founding Chair of the USGBC's LEED® for Healthcare core committee. Gail was a Loeb Fellow at Harvard University from 1998-1999. She is co-author, with Robin Guenther FAIA, of Sustainable Healthcare Architecture, published by Wiley, and was featured as an Innovator: Building a Greener World in TIME Magazine in March 2007.

