CRADLE TO CRADLE HOME DESIGN

Process and Experience

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This chapter addresses sustainability generally and the various components and approaches that designers take to develop a "green" design. The direction that is the most fruitful is the one provided by cradle to cradle. This first chapter, then, becomes the cradle to cradle "primer." It will introduce the cradle to cradle perspective, its tenets and principles, and discuss their application to design decisions regarding lighting, building envelopes and interior components, heating and cooling, energy, water, and waste. You will be reminded of the promises and challenges of sustainable design, and be introduced to a positive ecological approach to design that is redefining the human presence in the world.

The C2C Home Design Competition raised awareness but also revealed designers' confusion or misunderstanding about cradle to cradle design. A working knowledge of the various approaches to sustainable design provides perspective regarding the unique position held by cradle to cradle. Simon Guy and Graham Farmer (2001) developed a useful framework for understanding these competing views—a framework that places various views of sustainable design into six categories: eco-technic, eco-centric, eco-aesthetic, eco-cultural, eco-medical, and eco-social. Each view is organized around one particular area of emphasis, characterized by distinct formations of space and site, and heavily influenced by one or more issues related to our current environmental situation. Using examples from the C2C Home Design Competition to illustrate each of these approaches demonstrates the limits of conventional design thinking regarding sustainable design, thereby emphasizing a more holistic approach inherent in cradle to cradle design.
An eco-technic approach to sustainable building relies on prevailing views from the twentieth century, which assumed that science and technology could and would provide solutions to challenging conditions, whether those challenges were generated by human activity or by that of the natural world. At the core of the eco-technic view is the belief that all problems can be solved through science, engineering, and technological advances. Ironically, this very approach is complicit with many of the problems and challenges we currently face in our world, especially in the building industry. For example, the long-standing practice of burning material for heat advanced from open fire pits to sophisticated systems that combust coal, oil, and gas. Yet these technological advances that produced more efficient and safer means of burning significantly increased greenhouse gasses to dangerous, climate-changing levels. Nonetheless, this long tradition of problem-solving through science, the eco-technic view remains a prevailing approach to sustainable design.

An eco-technic approach to design relies on a combination of technical and scientific methods such as energy efficiency, alternative means of heating and cooling, including geothermal systems, and high efficiency organic LED lighting. Scores on instruments that rate or measure the success of such design strategies, e.g., Leadership in Energy and Environmental Design (LEED) Green Building Rating System™, Building for Environmental and Economic Sustainability (BEES®), and the Green Guide for Health Care™, generally reflect compliance within the technical realm to a collection of standards. Much of the work of well-known designers such as Sir Norman Foster, Richard Rogers, and Renzo Piano may be described as eco-technic with its use of innovative glass and solar shading, intelligent facades, and photovoltaics.

Not surprisingly, submissions into the C2C Home Design Competition were often examples of an eco-technic approach. The submission “Natural Elements” (see Figure 1.1), for example, includes an energy analysis summary of the heating and cooling loads for the proposed project. A section view demonstrates features that make the proposed house energy efficient and retain the controlled environment.

The design of “C2C Home” relies upon a series of assemblies: roof, envelope, and foundation (see Figure 1.2). Energy consumption is minimized through active and passive collection of solar energy.

One final example of an eco-technic approach to sustainable design uses modules of masonry, wood, and glass to form a demountable and reconfigurable house. Overhangs and an interior Trombe wall protect the interior from the sun in the summer and collect and store heat in the winter (see Figure 1.3). A belowground cistern is used for rainwater collection and lawn irrigation, and a green roof minimizes rainwater runoff.
"Natural Elements"

C2C - Cradle to Cradle - Home Design Competition
Roanoke Regional Housing Network
1.2 "C2C Home" demonstrates an assembly approach to an eco-technic project.
An eco-centric approach to sustainable design is not only contrary to the eco-technic view, but also disparages its underpinnings regarding the ability of science and technology to solve problems. The problems are just too complex, too big, and too uncertain. In contrast to the eco-technic view, an eco-centric approach is grounded in a holistic, ecological view of nature. An eco-centric view acknowledges both living and nonliving objects within pervasive, multifaceted ecological systems. To illustrate, consider Native-American beliefs in which inanimate objects such as trees and land are understood to have spirits and to engage in harmonious relationships with living creatures. "What you people call your natural resources our people call our relatives" (Lyons, 2002). The role of human beings in this all-encompassing ecological system views stewardship determined not by human activity but by naturally occurring parameters. "Exceeding these limits . . . will have catastrophic results, with nothing less than planetary survival at stake" (Guy & Farmer, 2003, p. 143). Two well-known examples of an eco-centric view are biomimicry and ecological design.

Janine Benyus (1997) looks to nature as model, measure, or mentor to guide design and development of human-made environments and objects. As a model, nature demonstrates effective objects and systems such as a "solar cell" that is, in fact, a leaf. As a measure, nature has accrued an impressive record validating the ecological practice that has occurred on this planet over the last 3.8 billion years, and this record will show us, if we pay attention, what works and what doesn't. And as a mentor, nature offers guidance: "Virtually all native cultures that have survived without fouling their nests have acknowledged that nature knows best, and have had the humility to ask the bears and wolves and ravens and redwoods for guidance" (Benyus, p. 3).

Similarly to biomimicry, ecological design also assesses humankind's relationship with nature. "Ecological design" is defined in a book by the same title as "any form of design that minimizes environmentally destructive impacts by integrating itself with living processes" (Van der Ryn & Cowan, 1996, p. 10). These authors portray our current planetary condition as one consisting of two intersecting layers: a living world forged over billions of years and a second nascent world that humankind has been...
developing. The lack of integration between these two worlds creates the unsustainable condition in which we find ourselves. Ecological design reminds us that human beings are but one of many species sharing the planet and calls for an integration of humankind into existent eco-systems, all the while maintaining the quality of the world habitat.

As examples, biomimicry and ecological design illustrate the fundamental underpinnings of an eco-centric view in which nature and its equilibrium can be disrupted easily. In this view, the built environment developed over the last several millennia by human beings is decidedly unnatural. A number of entries into the C2C Home Design Competition ascribed to an eco-centric approach to sustainable design by emphasizing various ecological systems.

As its title implies, the Forest House uses the structure of a forest as inspiration for the design (see Figure 1.4). The house itself consists...
1.5 “House You Can Eat” is an example of eco-centric design that extends plant growth from the ground to the built form.

of a canopy over a thermal mass base that anchors the structure to the site. Exterior walls and roof have deciduous shade absorbing plant life.

The designers of the “House You Can Eat” developed a structure that supports plant growth (specifically, Vitis riparia; see Figure 1.5). In fact, the exterior of the house melds with the site and is not recognizable as a built form.

The “Organic Home” takes a biomimetic approach and is inspired by the mud tubes of termite mounds (see Figure 1.6). In plan, the resulting residence consists of a series of connected and sometimes overlapping circles. The three-dimensional expression mimics the appearance of termite mounds.
The eco-aesthetic view extends beyond either an efficient use of resources or an ecological context. Eco-aesthetics emphasizes impending social change that will fuel a new cultural awareness and requisite (new) communities. This view is characterized by “individual creativity and a liberated imagination combined with a romantic view of nature that rejects Western rationalism, modernism, and materialism” (Guy & Farmer, 2001, p. 143). Designers working during the formative stages of the eco-aesthetic view include Frank Gehry, Randall Stout, and Santiago Calatrava, whose work presented a new aesthetic that was made possible by innovations such as computer modeling and advances in structural engineering. Their design thinking which was not only predictive of changes in design, but it also searched for a new paradigm, merging technological innovations with ecological models that facilitated development and fabrication of fractal and organic forms that were distinct from the existing more traditional, formalist interpretations.
Because of its interest in social change, new technologies, a shift from "utilitarian values," and use of nontraditional, sensuous forms, the eco-aesthetic view seemed by some designers entering the C2C Home Competition to be synonymous with cradle to cradle design thinking.

The "Submarine Salvage House" uses the hull of a salvaged submarine as the structure for the proposed house (see Figure 1.7). The resulting design is explained using solar and wind diagrams. The new aesthetic being proposed is one in which all materials are recycled waste—in this case, an actual decommissioned submarine.

The design of "House Without a Center" assumes a phenomenological approach in which the house is no longer conceived as a discrete object but as "a series of interventions on the landscape" (see Figure 1.8). The proposed design with its occupied layers is composed of permeable membranes.
This entry also called “C2C Home,” is like other eco-aesthetic designs and not recognizable as a traditional house (see Figure 1.9). A series of spherical forms partially submerged belowground are crowned with ocular openings that allow sunlight to enter through the top of each dome-like structure. Like the work of Frank Gehry or Randall Stout, the forms are computer generated, new, and one of a kind.
and the diversity of existing cultures. Buildings respond to the individual character of a region and seek to create a sense of authentic place. Because “universal and technologically based design methodologies . . . often fail to coincide with the cultural values of a particular place or people” (Guy & Farmer, 2001, p. 144), the eco-cultural view stresses the particular characteristics of place, the use of local materials, a response to existing geographic and climactic conditions, and cultural continuity.

The design of "A 4 Not So Square" is typical of American Foursquare houses commonly found in neighborhoods throughout Roanoke, Virginia (see Figure 1.10). The design is based on local, vernacular house-building traditions and is made to blend with the existing neighborhood.

A few entries make reference to the historical neighborhood in which three of the four sites for the competition were situated. Figure 1.11 illustrates a house for "sustainable living within a historic place." The house form in this particular entry is traditional with its front facing porch, two-story volume, conventional floor plan, and typical materials used on the exterior.
1.11 This entry into the C2C Design Home Design Competition relies heavily upon the historical context of the neighborhood.

ECO-MEDICAL

The fundamental concern underlying the development of the eco-medical view is the multitude of issues caused by buildings that separate people from nature in sealed, technologically intense spaces that also deny the users opportunities to control their environments. Manufactured air is delivered at a universal temperature, volume, humidity, and sometimes scent. Lighting often is fixed and either on or off. Views of nature are limited or nonexistent.

Perhaps the greatest concern is indoor air quality. Many interior materials have traditionally "off-gassed" or released toxins into the interior environment when installed, used, maintained, or removed. Measured as gasses, "volatile organic compounds," or VOCs, may cause temporary conditions such as eye irritation, chronic conditions such as allergies, or terminal conditions such as cancer. Poor indoor air quality can result in
sick building syndrome, the spread of pathogens causing illnesses such as Legionnaires' disease, and the growth of mold. The eco-medical view, then, is focused on health and wellness, drawing from clinical ecology as well as environmental medicine. The work of Peter Schmid and the Gaia group from Norway illustrate the fundamentals of the eco-medical view. The “Breathing House” is designed to clean and purify the air (see Figure 1.12). The exterior east and west walls include six-inch channels filled with water containing chlamydomonas, a type of green algae, which undergo photosynthesis. A separate 12-inch deep channel at the base serves as a trough with water hyacinth that cleans the water. A sedum roof and exterior skin filter out unwanted particles.

“Im Livin’ It” features low toxicity or low VOC finishes and furniture as a means of controlling air quality (see Figure 1.13). This eco-medical design demonstrates an emphasis on human health.
As opposed to technological, ecological, philosophical, cultural, or medical views, an eco-social view professes that human beings only will be able to live in harmony with nature when a model of community is created that "... serves common needs and goals, where humans experience true freedom and individual self-realization" (Guy & Farmer, 2001, p. 145). In contrast to this view are long-held, pervasive social traditions centuries in the making that often reflect the domination of one group by another. This sense of dominance and authority transferred "control" of the natural world to humans, which ultimately led to environmental degradation. This effect can be reversed only with societal decentralization into smaller communities under area control, regional resources, and a healthy, local economy. The eco-social view then, "suggests the creation of buildings that embody and express the notion of a social and ecological community in which democratic values such as full participation and freedom are the norm" (Guy & Farmer, 2001, p. 146). Examples of this approach to sustainable design include Habitat for Humanity and Architecture for Humanity and their intention to provide homes, not houses, by connecting locales and individuals with regional resources and participatory design processes. The eco-social view also was prevalent among the C2C Home design competition entries.

The "BYO House" design uses prefabricated systems designed to be erected by an owner, friends, and neighbors (see Figure 1.14). When an expansion is required, it can be done the same way. When someone needs to move, the same process could be used. The focus is on social and community interaction, not unlike traditional "barn raising."

"House Growing" approaches eco-social design in a different way (see Figure 1.15). A centralized program generates house designs within a specific community to meet the needs of individual homeowners, while adopting similar responses to general conditions such as "place bedrooms so that they will face the sun in the morning" (from the project board). By doing so, the houses in an area begin to respond to one another, thereby altering the entire community. "Houses might start to lean on each other, or streets begin to move—green spaces form spontaneously... by adjusting the rules by which they grow we can build houses that will share—with their inhabitants, with each other and the world" (from the project board). Thus, the neighborhood or community develops organically from the presence of its members and their shared needs for housing in a particular place.
“House Growing” describes the emergence of communities generated by designs of individual houses that are responsive to each other.
Sustainable design considers economic, social, environmental, and aesthetic conditions that are interwoven and interdependent, i.e., a change in one causes irreparable changes in the others. Sustainability, then, eliminates language regarding "balance" or "trade-off," which indicates only that some part of something has been sacrificed to accommodate another piece of something else. If the condition or object is sustainable, then economic considerations, social equity, and environmental and aesthetic conditions are all realized fully. For example, mountaintop removal of coal is a practice that is devastating to the environment as well as the lives of those who live in the region. This devastation is supposedly balanced by some degree of economic development. But in reality, the opportunity for the development of schools, churches, and the local economy, along with the beauty and elegance of the mountains, which could fuel eco-tourism, all are being traded off for the financial gain of a small number of people and businesses. Thus, despite any rhetoric, the practice of mountain top removal is unsustainable. We can use this one condition to illustrate and summarize the various approaches to sustainable design that Guy and Framer describe.

- Eco-technic: This approach to sustainability would assume that scientific innovations and advances in engineering can explain or resolve any residual problems, such as cracked aquifers, leach ponds, and underground disasters caused by mountaintop removal, and thereby could become a sustainable practice.
- Eco-centric: This approach would reveal the disruption of ecological systems caused by mountaintop removal by contrasting environmental stewardship inherent in natural systems with human activity.
- Eco-aesthetic: This approach would focus on an increased awareness of nature and the nonhuman world as opposed to forceful human activity and destruction of a natural condition to retrieve an energy source for human beings.
- Eco-cultural: This approach would disparage the unmindful destruction of the regional culture for the extraction of coal.
- Eco-medical: This approach would expose the devastation to human and environmental health unearthed by mountaintop removal of coal.
- Eco-social: This approach would publicize the domination of one group of corporate executives and stockholders over another group of local residents and of the natural resources specific to a region.

Although each approach is relevant to the situation, none can either alter or wholly address the complexity of unsustainable practice. In contrast to these more narrowly focused views, the cradle to cradle paradigm provides a comprehensive framework for design that is grounded in the effectiveness of natural cycles (McDonough & Braungart, 2002).

ORIGINS OF CRADLE TO CRADLE

Walter Stahel, a Swiss architect and founder of the Product-Life Institute (1982–2008), is credited with coining the term "cradle to cradle" during the 1980s. He had begun in the 1970s to explain his views of a "loop" or "circular economy" that generated sustainable profits based on waste prevention strategies and of goods as opposed to ownership, which is a practice that ultimately results not only in a loss of energy and resources but also in the deposit of products in a material grave such as a landfill. Fundamental to Stahel's work were links among three interconnected pillars—"ecologic, economic, and social compatibility." Stahel wrote that "[re]utilization of goods and components based on [re]cycles, close loop material resources was a sustainable, profitable business strategy that would generate effective corporate policies as well as jobs.

"Cradle to cradle" also became the central focus of William McDonough and Michael Braungart's work. They further explained and developed cradle to cradle thinking in their 2002 book, Cradle to Cradle: Remaking the Way We Make Things. Not unlike Stahel, McDonough and Braungart also articulate fundamental links among ecological, equitable, and economic
interests (McDonough & Braungart, 2002a; 2002c). They write that when these mutual relationships are honored, the consequence is a “... world of commercial productivity, cultural wealth, and ecological intelligence” (McDonough, 2003). To illustrate, consider the mountaintop removal example discussed previously. Should the mining stop, the remaining mountains that boast a diversity of plant and wildlife could provide recreational and educational opportunities from hiking to cross-country skiing to kayaking to bird-watching. Eco-tourism would create the need for additional services in the area such as food, lodging, and perhaps upgrades to the infrastructure, thereby creating additional jobs for the local residents. Visitors to the area could relish in the local, now stable, culture saturated with music, art, crafts, and cuisine. And a thriving local economy would fuel the development of schools, homes, and businesses—all from respect for local environmental conditions that are honored and sustained rather than mined.

Importantly, the relationship between the economy, social equity, and the environment is grounded fundamentally in the practice of looking toward nature as a model. And when we do so, we see that “nature” is characterized by regenerative cycles: organisms that feed other organisms, a diurnal rhythm or cycle of lightness and darkness across a 24-hour period, seasonal cycles that occur across the course of a year, prevailing breezes and winds, ecological systems that rely on recurring daylight, temperature, air quality, instinctive behavior, and so on. The importance of these cycles is clearly expressed in the three tenets of cradle to cradle thinking: waste equals food, solar income, and diversity.

**WASTE = FOOD**

Regenerative cradle to cradle cycles are realized in two forms. In the first, organic compounds such as the fruit of a tree that falls to the ground is consumed by animals, insects, organisms, and microorganisms. The nutrients that result from the process of consuming this fruit, whether through the digestive tracks of animals or the decaying processes of microorganisms on the ground, provide fuel for the tree to ultimately produce more fruit. “Waste” generated at any point in the cycle thus becomes food for the next step in the process.

Biological nutrients may also result from human activity when the component materials (e.g., organic fibers spun into yarns that are woven into fabrics) return to the natural world to decompose and again provide food for the next step in the biological cycle.

Yet capitalizing on biological systems will not be enough to sustain either the planet or its living organisms. Further, because we live in an industrial age, the manufacture of goods and services will not vanish. A second form of regenerative cycle embraced by the cradle to cradle paradigm involves a technical metabolism.

In a technical cycle, materials, substances, and component parts assume successive useful lives rather than terminate in a material grave. In these technical cycles, companies, for example, may “lease” materials that they later reclaim at the end of a first useful life and reuse in a successive product or material. Businesses and corporations then may provide services such as the use of carpet. For example, rather than relinquish ownership of the carpet which contains massive amounts of raw material, intellectual capital, and embodied energy that need not be lost or relegated to a material grave.

**SOLAR INCOME**

A second tenet of cradle to cradle regards the use of solar income. Generally, we recognize the value of solar income in terms of daylighting and active and passive systems that generate heat, energy, and lighting. Yet many alternative sources of energy rely on the sun. Wind energy, for example, is generated by consistent circulation patterns that occur with geological diversity and areas of warmed and cooled air that rise and fall. Tidal power is influenced by gravitational forces of the sun and moon on the earth. Biomass fuels are clearly impacted by the effect of the sun on the growth of plants. These interdependent, reciprocal effects are based on reliable systems of component parts that generate ultimately from the constant availability of solar income. We don’t have to mine it to make electrical power. We don’t have to burn it. We don’t have to manufacture it to provide a course of lighting. We need just take advantage of its constant presence.
A third tenet of nature-inspired cradle to cradle thinking is diversity. Even in the previous examples we see diversity of interdependent components of more complex systems. In the built environment, diversity is a consequence of knowing a place, its unique features and characteristics generated whether by people or natural conditions. Buildings sited so as to manifest the range of local materials; acknowledge the variations among the immediate culture; respond to particular climatic conditions regarding sun, wind, water, and vegetation; effectively value and employ the three sectors (economy, ecology, equity); and foster the distinctive growth and development of the community.

Cradle to cradle thinking as a paradigm, then—as a framework encompassing theories, methods, standards, practices—orders the complexities involved in the design of the built environment such as those views outlined by Guy and Farmer (2001). For example, an eco-technic view signals the importance of re-thinking manufacturing processes—this is inherent to cradle to cradle thinking. Eco-centrism reiterates nature as a model, whereas an eco-aesthetic view encourages the development of new ways of thinking regarding the relationship of humans and the organic, expressive, non-linear natural world. An eco-medical view is realized by McDonough Braungart Design Chemistry in its application of standards to products and materials to determine their effects on human and environmental health (“Certification overview,” n.d.). And eco-cultural and eco-social views reveal values related to environmental, cultural, and social factors. The C2C paradigm encompasses each view.

The C2C Home Design Competition demanded a new way of looking at sustainable design beyond current standard practices, as does the cradle to cradle paradigm. Designers entering the competition were further challenged to consider new ways of manufacturing and new materials necessary to fulfill the parameters established by the cradle to cradle paradigm. When faced with these challenges, many designers defaulted to known ways of detailing sustainable buildings. As a consequence, many of the entries reflected more narrowly defined views to sustainable design and fell short of the intended goals of the competition—to design a cradle to cradle house for lower income families in Roanoke, Virginia.

The scale and breadth of the C2C paradigm that creates the challenge also makes it vulnerable to criticism. Some critics argue that cradle to cradle design is un-achievable and over-sold (see, e.g., Sacks, 2008). Nonetheless, the relentless efforts of William McDonough and Michael Braungart to bring attention to issues regarding sustainability, and to cradle to cradle specifically, perhaps have been more effective at raising awareness of our unsustainable practices and policies than the efforts of any others. Corporations such as Interface, Nike, and Ford—all having worked with William McDonough—have accepted the challenge to be better stewards of human and environmental health as well as of their own companies and employees.

Hosting a design competition that forced designers to address complex, far-reaching, or improbable conditions or materials merely raises the bar on the expectations. Designers should be challenged to develop buildings that generate more energy than they consume. They should be challenged to acknowledge the diversity of opportunities delivered by a site in terms of energy, water, light, and social and cultural communities. And they should be forced to abandon traditional thinking and standard approaches to design. Only then will we be able to break the cycle of destruction fueled by the [first] Industrial Revolution and achieve the regenerative, healthful promise of the Next Industrial Revolution.

The premise of this book is that we can do better than “green” design or “high-performance” design—that we can, in fact, develop a built environment that fosters human and environmental health, facilitates local economies, and invests civility and grace into our communities. If we adopt a prophetic, comprehensive approach to this challenge, then the traditional design process that ultimately progresses in a fairly linear fashion will not fit with the larger task at hand. A second challenge of this book is to enumerate a design process that reflects this approach to design.

Traditional descriptions of design process identify distinct stages that often begin with pre-design and/or programming, then progress to schematic design and design development, which then shifts to documentation of the work in terms of construction documents, contracts, contract
administration, and ultimately construction and occupancy (e.g., Winchip, 2007). Shokses (1989) describes a design process similarly: planning, programming, schematic design, design development, contract documentation, and contract administration.

Recently, more constrained and controlled design processes have become less rigid or prescriptive. The design process on the website of The American Institute of Architects is characterized by five phases (“The five phases,” 2006):

- Phase 1: originate—deciding to “move forward with a project”
- Phase 2: focus—developing a vision and concept for the project; programming
- Phase 3: design—developing the design and construction documents
- Phase 4: build—procuring materials and developing a time frame for construction
- Phase 5: occupancy—satisfaction with the built project and beginning to use or occupy the building

A less traditional design process proposed by Miller (1995) articulates three primary parts: the Known (basics, research, programming, concepts, and pre-design summary), the Unknown (sketching, modeling, creativity, and refinement), and Return to the Known (completion, presentation, and post-design). Miller’s process does articulate in more detail artistic, creative, intangible aspects that must by necessity combine with a practical component related to structure, materials, and function. Yet in most instances, the design process for designers involved in the built environment appears somewhat narrower than those processes described by artists. Even Miller in a description of his proposed design process states:

Based on my experience and research, there appears to be a fundamental cycle of information gathering by the designer, followed by creative synthesis on a continuing basis, then a return to the “facts” for checking, communication, and feedback: a cycle from the substantive realms of the mind and then back again (p. v).

Synthesizing, in other words, is: programming and research, schematic and design development, and contract documents.

A design process proposed by Bevlin (1994) begins with inspiration and moves into definition, creativity, analysis, procedure, clarification, and then evaluation. One might return to any step of the process at any time. For example, as a designer is developing the project (procedure), the material may present an opportunity the designer did not anticipate, thus engaging another “creativity” phase. To illustrate, consider an artist painting a landscape with watercolor. If the paper has been washed, the pigments from the paint will bleed in varying directions and patterns. If this violates a predetermined expectation, then the process stops and the project is abandoned; however, if the artist is flexible with the design process, then the unexpected event may ignite another idea (creativity) and the artist moves the same piece in a different direction (analysis and procedure).

Aspelund (2010) identifies a similar process of inspiration, identification, conceptualization, exploration and refinement, definition and modeling, communication, and production, whereas Laurer and Pentak (2000) describe a much simpler process that consists merely of thinking, looking, and doing, in any order.

**CONCLUSION**

Our task, then, is to combine the energy and liveliness of cradle to cradle with a design process that complements the emerging project at each step, stage, or phase. We begin in this chapter with inspiration (see Bevlin, 1994) which is inherently tied to observation.

The inspired designer observes the universe with sensitivity, absorbing impressions from every experience. . . . Often . . . the designer is made aware of new relationships and, seeing them in unique terms, works to give them a form that will make them apparent to others (pp. 27–28).

The inspiration for the C2C Home Design Competition is the cradle to cradle paradigm itself.