

Transcending Sustainability: Seeking Design's Alchemy

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Prologue

When I first started writing this piece I believed I was writing about architecture. This is no surprise since I am an architect and the original ideas emerged as I contemplated how I approached design. But as I looked deeper I saw the ideas were applicable to all of human work as we create our civilization going forward.

This inquiry is ultimately about how we answer the questions we ask regarding our relationship to the world. An architect would call this "programming". This is where we seek to understand the best approach for a given design. In a time of uncertainty, returning to these assumptions with fresh eyes reveals the opportunity to proceed down a path in harmony with this planet, our one and only home. It is also critical to bear in mind that if we ask the wrong question at the outset, no matter how hard we work, the results will be fruitless. No amount of talent, effort, or time will change this reality.

Indianapolis 2040: A Potential Future

It is autumn of 2040. I am flying to Indianapolis to visit my son. As the dirigible approaches the city, I look out over the scene below.

It is unclear where the city begins and the country ends. The city looks more like a forest than an area of human habitation. As we lose altitude, I notice many roofs are literally alive. There are wildflowers, prairie grass and small gardens in profusion. Punctuating this riot of color is the rich blue sparkle of solar panels, their precise geometry in contrast to the fluid grace of the trees glowing in autumn's splendor. I also see water in the neighborhoods. Canals stretch away toward downtown, depressed below the level of the street. There are small boats, pedestrians and bicycles moving comfortably along them.

We pass near Monument Circle and I think of what a pleasure it was to live here for most of my life. The new buildings mix with the old in a tapestry of stone, glass and metal. It strikes me suddenly that the city is beautiful.

The afternoon light throws long shadows highlighting commuter trains as they roll in and out of Union Station. I notice two types: classic designs developed over the course of the 19th and 20th centuries, and newer, lighter trains that look more like sleek, oversized buses than traditional rolling stock. The commuter trains run in the medians of the multilane highways looping into the heart of downtown. I'm struck by how much less automotive traffic I see. There are still automobiles, but fewer lanes on the major highways that feed downtown.

As we fly over the White River, I see boats moored and a fisherman packing his gear, catch in hand. West of the river, there is still industry, but no smoke rises from these enormous facilities. In fact, there is much industry, but it disappears, camouflaged, difficult to pick out and well mixed with the surrounding settlement.

There is little doubt that the city of Indianapolis is prosperous and successful. Although Indianapolis was highly regarded for the urban creativity that marked the 90's and early 21st century, much has changed since the beginning of the millennium.

What was just described is not a utopia. What is essential to understand is that this vision is possible now. No exotic technologies or superhuman effort are required. The catalyst for this transformation follows a thread reaching back to the beginnings of the environmental

movement. We began with fear: loss of cherished creatures, genetic damage to our children, cities shrouded in toxic clouds. The first response was to plug the pipe, to control pollution keeping it from the environment. There was an unintended result though. The pollution just changed form, liquids became solids and the poisons were as potent as ever. The system creating the poison was still intact.

In 1979 Michael Royston made an intellectual leap. He saw the problem of pollution in a new light, and proposed preventing pollution by transforming manufacturing to avoid the use of toxics in the first place. This was a breakthrough that slowly seeped into the thinking of a number of states and businesses reeling under a steadily increasing regulatory burden. The benefits were manifest: little or no regulation, no pollution and an improved bottom line. The challenge was the need to think in a fundamentally new way with respect to manufacturing. In addition, many industrial processes were unable to change without a complete re-engineering of their basic processes. In short, there were significant opportunities for the creative business mind, yet many obstacles remained to the full reinvention of modern manufacturing.

In architecture, the first responses to the environment were clumsy and often stunningly ugly. The few remaining built survivors from the 1970s are a testament to concern about energy costs and the beneficence of federal tax incentives, but little else. The design professions sensed something was wrong though and continued to worry the problem around in academia and practice. With the founding of the American Institute of Architects Committee on the Environment in 1990, architects had a voice for their concerns. In the intervening decade and a half, the basic principles of green design were articulated by the design professions and construction industry. At this point we are clear on the general shape of the challenge. Midway through the first decade of the 21st Century, we see notable improvements in building energy performance, reductions in resource use and improvements in indoor environmental quality. Many successes are available for study and emulation. The explosive growth of organizations like the United State Green Building Council illustrates the continuing migration of the market toward green building.

Over the last 30 years, impelled by the energy shocks of the 1970's, new industries in wind and solar power took shape. Sometimes these ventures grew robustly and at other times, when the illusion of cheap oil was successfully reincarnated, lost ground as they continued to innovate. With energy price increases over the last five years, renewables have once again started to ascend and spurred research into more sophisticated technologies as well. A rapid expansion of markets in ecological and recycled materials is underway now. The quality of these goods varies across a spectrum from barely "green" to remarkable products that embrace natural principles at an unprecedented level. The Mid-west is slowly turning the question of green potentials over in its collective consciousness. My home, Indianapolis, is slowly coming to life. In another major Midwestern city, the ongoing commitment of Chicago is remarkable and the leadership of Richard J. Daley, Jr. is at the helm of this transformation.

There is a nagging question however; if this movement continues to its logical conclusion, will the changes be enough to offset global environmental damage? How much must our culture change to reclaim the diversity of life that is the foundation of this planet's resiliency? As William McDonough and Michael Braungart note in *Cradle to Cradle*, is it enough to be "less bad"? They ask telling questions about how human systems might be transformed to mirror their counterparts in nature. To have our built environment intentionally mimic ecological systems would turn the classic human idea of controlling nature upside down. We would literally get our cake, eat it, then return it to the natural world and have the opportunity to eat it again ad infinitum.

As we contemplate our human-made environment, the separation between people and nature could hardly be more obvious. Yes, we are trying to move toward an ecological sensibility. No

argument. Yet what might nature offer us as benchmarks for design of our dwellings, buildings, industry, infrastructure and cities?

Ecology: The Basics

Nature presents discreet entities yet each is completely connected in an endless exchange of energy. While a beetle or red tailed hawk are separate creatures with their own agendas, they act within a broader system with clear laws and limits. Humans use technologies founded on fossils fuels to skirt nature's limiting factors, but we are simply spending a loan against future diversity. Payment will be demanded soon enough by nature's clock. In the meantime, all living organisms make exchange with the surrounding environment using and giving up energy as they transit the arc of their lives. Their experience of, and exchange with, the environment is direct and local. In mature ecologies, the entire metabolism is a net benefit to the system as a whole. Processes work on varying scales from the microscopic to the apex of the food web. Ecosystems are identified with broad patterns such as forest, prairie, savannah, dune, and wetland. Nature is resilient. Nowhere is this more evident than in places where an existing system is destroyed. Ecosystems experience a process called succession. Life immediately fills in the newly desolate place and then, if allowed to continue undisturbed by humans or other intervention, continues a process of generating successively greater complexity. Early systems are fast growing with high energy usage and short life cycles. Mature or climax systems are characterized by high diversity, long life cycles and low energy usage. These changes occur in a steady rhythm spanning hundreds or even thousands of years.

Human Settlement: Community

The fundamental building block of living things is the cell. The cells combine into organs, the organs systems and the result is an integrated whole, a functioning organism engaging the environment; taking up energy, growing, dying and being reborn in endless repetition and variety. Our settlements behave in much the same way weaving the sustenance we need with shelter, services and culture. The principles of organization evinced by organisms can be applied at the appropriate scales for individuals (cells), villages or neighborhoods (organs), and the city (organism). Essentially we are confronted with a fractal. Following the scale upward from cell to ecosystem to planet we observe a continuous, uninterrupted cascade of interconnected energy. Everything is alive in its own way and offers practical knowledge as we seek the return to an environmental connection that fundamentally we all share.

As we contemplate American cities, the trend toward gigantism is striking: giant power plants, road systems, buildings, infrastructure, giants everywhere. Gigantism begets centralization, a concentration of service or resources that supports a large segment of the local population. A commonly used phrase is "economy of scale". Our energy sources are far removed. Such systems give up efficiency through friction and transmission losses as they supply "nutrients" like water and electricity. If a system fails, thousands may be inconvenienced and, in the worst case, at risk of health consequences from minor to fatal depending on the situation. The Northeast Blackout of 2003 is a prime example of a systemic failure on a massive scale that affected the eastern United States and Canada. In the United States fully 40 million people lost power, one seventh the total population. This is astonishing given the apparent sophistication of our electrical grid, but it happened nonetheless.

We can conclude that a number of choices we have made illustrate flaws within our infrastructure. As the extent of the service area grows, so does the possibility of an inevitable systemic failure. Perhaps gigantism, rather than being a servant, has become our unintended master. When we couple the pitfalls of large scale with recent surges in energy costs, the picture takes on a grim countenance. And as we contemplate energy, the thread inevitably

leads to oil, a finite resource that is the foundation upon which our civilization now precariously rests. We have a problem in that we are roughly midway through the available oil on the planet. The commonly used term is "Peak Oil". As we pass peak, the relentless, growing demand for oil from the United States, China, India and Europe exceeds supply. As a result, prices begin an inexorable rise. There is some debate about whether we have passed the world-wide peak or not, but there is little doubt that we are very near if not beyond this milestone. When peak oil demand is coupled with locations in many unstable parts of the world, the fragility of the situation is starkly illuminated.

We are faced with nothing less than the reinvention of our planetary economy based on the sun, choosing, or being forced to choose, an energy source derived as is by every living thing. The nature of this choice is critical now. The reality is that we are engaged in a race we cannot win. At this point a seamless transition is impossible. We know we will finish behind, but the critical question is how far? If our cities begin this work in earnest now, the difficult transition will be less daunting. Every day wasted is irretrievably lost.

Design

A nearly unimaginable amount of energy and resources is used by our built environment. Fully 39% of all the energy produced in the United States is consumed by buildings in the residential and commercial sectors. With this in mind, it is obvious that significant opportunities for improvement are available at this very moment. With this in mind it is interesting to ask: What if buildings were created in relation to each other like ecosystems that regulate the complex life within air, earth and water? How would our cities change? How might we begin the process of transformation?

Design as a human activity may trace its origins all the way back to the emergence of human consciousness in concert with the opposable thumb. As humanity interacts with the environment in the here and now, design pervades every activity from architecture to package design, automobiles to microelectronics.

The opportunity available now is to take up a thread within the design disciplines that ties directly to local ecosystems whether still in place or extirpated decades previous. Designers make continuous choices in design's early stages. During this time the basic palette of form takes shape. To use the local ecosystem as a point of origin for design choices allows the emerging work to absorb the sensibility of life in the immediate surroundings. For example, little of the original ecosystem in an urban setting remains. This condition requires designers to research a site's ecology prior to human intervention. Central Indiana was old growth forest 200 years ago. As we look to nature, the land suggests that the most successful ecosystem available then and now is old growth forest. We fully absorb the ecological history of the land. Thus, as we look to the creation of a living architecture, a living city, the underlying net of design choices is firstly nested within the ecosystem or bioregion of the site.

Our communities hold the knowledge of institutions, traditions and patterns of living. Design's threads are inevitably composed of anthropological memory where we uphold the traditions of place. We do this most often with little careful reflection. As designs emerge, choices are made automatically. This is not a criticism; experienced designers use their accumulated work as a well whose conceptual water is drawn quickly and efficiently, applied with dexterity to solving a given problem. Residential design is a perfect example. How many designers give more than a second thought to placing public, semi-public and private spaces in a home? The answer is obvious: placing these spaces is second nature. However, from the moment we consciously take up the knowledge associated with an ecology of place, the design process takes on a topology that requires the designer to return to a process that again is new and not fully formed. This new land finds us somewhat uncomfortable, thrown out of the easy, tacitly made

choices that have served us for perhaps decades. The opportunity for lasting value in our design of buildings, spaces and communities lies in the fusion of ecological knowledge with our cultural traditions.

The term holistic design is occasionally used to envision a process that infuses the totality of the design process and integrates the various elements of a building and site. An evolved design process would ask us to relate architecture, land and interior environments at a level of integration never seen before. In addition, as new structures were created, each would be considered in the context of its neighbors and inquire after opportunities for added synergism, diversity, energy production, and increased delight.

This environment may take many forms. No prescription in terms of aesthetics is suggested here. What is suggested is a methodology to engage the design process with fundamentally different questions from the norm. In answering these queries, the process is enriched and the results evolve beyond typical practice. Each place with its unique history, people and ecologies will produce remarkable solutions that enrich us all. To summarize, if we were to employ only two broad principles to ground this process we would seek a steady increase in local sources of energy, food, materials and skill. Second, we would actively seek to emulate the natural processes native to a place. To test and prove our thesis we must locate pioneers who will take risks with us to explore an intentional design process, develop new technologies, blend ancient principles and regenerate a respect for the sacred act of making space for human beings to be fully alive.

With this in mind, what if the boundary between building and land was blurred? What if a building made its own energy? What if the site and structure contributed to the diversity of life? What if a building, in concert with its site and interior, excited joy in the hearts of the owners, visitors and users? What if we thought of our built environment as being alive?

Postlude:

What can you do now?

Look to nature for inspiration and learn the original ecosystems of the land you now reside upon.

Recalibrate the meaning of wealth: food, shelter, family, meaningful work, community with humans and nature.

Create local opportunities to build community around food, play, creativity, and learning. Make these principles visible in built form, learn and share the results with anyone who will listen.

Seek alternatives to fossil fuels and emphasize local sources of energy that are benign (the nearer to sunlight, the better)