

HOW TO DESIGN FOR HUMANS

The latest wave of sustainability puts people first.

by Jonathan C. Weiss, Kath Williams, and Judith Heerwagen

While the international sustainability movement has profoundly affected the built environment, architects know that green buildings must do more than effectively use natural resources. These facilities also need to support the health, prosperity, and happiness of their occupants and neighbors, so that the "people resource" used during the life of the facility contributes to global sustainability. These are lofty goals, indeed. But in the spirit of Thoreau's question "What is the use of a house if you don't have a tolerable planet to put it on?" one might ask, "What is the use of a building if it is not a tolerable habitat for people?"

Human-centered sustainable design (HCSD) describes a comprehensive, anticipatory approach to building design that integrates the functional requirements of facilities with state-of-the-art knowledge about people's physical, psychological, and behavioral needs. Rather than relying on the architect's intuitive sense of people and organizations, HCSD requires that architects expand the dimension of issues that are consciously and deliberately considered during the design process.

HCSD is a relatively new term, but its roots are older. In *New Organic Architecture: The Breaking Wave*, author David Pearson describes what is now a global school of humanistic architecture that gained prominence in Europe in the 1980s. Influential contemporary practitioners include Joachim Eble of Germany; the Wales-based author of *Places of the Soul*, Christopher Day; the Hungarian Imre Makovecz; and Amsterdam's Rau & Partners and Ton Alberts & Max van Huut. The U.S. architects Maryann Thompson and Charles Rose, former partners who designed several educational buildings here and in Europe, are also associated with this school of thought, according to Pearson. Other proponents of human-centered design include the author Donald A. Norman, whose books such as *The Design of Everyday Things* consider the effects of people's tools and environments on human actions and reactions.

A KINDER, GENTLER SUSTAINABILITY

Architect Randolph Croxton and interior designer Kirsten Childs formally introduced the concept of HCSD in the United States in 2000 in the Earth Pledge Foundation's widely read *Sustainable Architecture White Papers*. Similar notions—"phylogenetic design," coined by workplace futurist Betty Hase; "humanistic sustainability," offered by architect Sandra Mendler; and "sustainable human factors," created by a coauthor of this article, Judith Heerwagen—reflect the inexorable link between sustainable design and a facility's support of occupant needs. Budding American interest in HCSD has been accelerated by a seminar on the subject at last year's U.S. Green Building Council (USGBC) conference and through lectures



While human-centered sustainable design is an American term, its roots trace mainly to Europe, where current practitioners include Joachim Eble, known to devotees as the "grandfather of green." Among his most celebrated projects is the Prisma Building in Nuremberg, Germany (1996), a mix of housing, retail, and office space centered around a glass-enclosed atrium containing plantings and cascading rainwater brought inside for fountains. Developers and governments have credited Eble's midscale, mixed-use projects, which incorporate community participation in the design phase and have extensive natural features, for revitalizing several blighted urban areas across Germany.

by European proponents such as Eble, who spoke at the Massachusetts Institute of Technology last month.

While definitions may vary, HCSD synthesizes a number of design attributes that impact the actions and reactions of people: ergonomics, biophilia (the human affinity for natural things), security, universal design, gender perception, and cultural values regarding aesthetics and comfort. Designers subscribing to the ideas of HCSD believe that such attributes are vital to a building's sustainability and that some, because they can be objectively quantified, should be incorporated into sustainable-design guidelines such as the USGBC's LEED rating system.

Critical to the HCSD approach is the mindset that facilities are *habitats for people* and, thus, that spaces and structures be designed to accommodate human physical and psychological characteristics. First, HCSD practitioners believe that buildings positively impact human health if they incorporate aspects of the natural environment that confer fitness to humans during their physical evolution—features that relate to the idea of biophilia developed by Harvard zoologist

E.O. Wilson. In addition to naturalistic forms, plantings, and water features, biophilic building elements include: extensive visual access to the outdoors; multiple enclosures and refuges; overhead built "canopies" to give a sense of protection; and changes in elevation to allow surveillance. Beyond their aesthetic contributions, such features have been shown to reduce stress and improve mental functioning in government and private-sector productivity studies.

Of course, biophilic features alone don't guarantee a healthy building. Other factors include the now-standard fare of sustainability: indoor-air quality, noise reduction, and personal comfort controls for occupants. Yet critical to HCSD is ergonomic design—fitting tools and environments to people's physical, psychological, and behavioral needs—which improves both individual health and group productivity. Another facet is universal design—built environments that people can safely and effectively exploit through all stages of life, regardless of physical ability—which minimizes the need for renovations over time. A final design criterion for HCSD is passive and active security: surveillance, access control, resistance to biochemical agents, and protection against catastrophic events. These enhance building sustainability by safeguarding "people resources" and ensuring continuous operation of the facilities.

Borrowing terms coined by Australian biologist Stephen Boyden, proponents of human-centered design consider buildings successful only when they meet both the "survival needs" and "well-being needs" of humans. To uncover these parameters, HCSD architects focus on a highly collaborative design process—Eble calls it "citizen participation"—that includes all project stakeholders and relies on an environment of trust. To deal with common stumbling blocks like the client's organizational culture or pre-established "building committees," HCSD practitioners reach beyond these constraints to include in the design process "change agents," defined by educational researchers Gene E. Hall and Shirley M. Hord as the people within an organization who are directly responsible for the health, safety, and welfare of its members.

CONSTRUCTING CREATIVITY

Underlying HCSD is the belief that certain built environments support learning and creativity better than others, an idea examined in the 1999 book *Peopleware: Productive Projects and Teams* by Tom DeMarco and Timothy Lister. So why are some places more effective than others? "The patterns that crop up again and again in successful spaces are there because they are in fundamental accord with characteristics of the human creature," they concluded. For HCSD proponents, the attributes of these places include: access to flora and fauna, unplanned social encounters, occupant control over their spaces, and the opportunity to work uninterrupted in quiet environments. Reinforcing positive emotional states is how environments aid in creative problem solving—and organizational success.

Maximizing our ability to learn and create is vital to our sustainable future. By applying HCSD, designers can craft a built environment that best deploys the material, human, and financial resources of client organizations, contributing to nothing short of a more sustainable society. While much of HCSD may seem like common sense, the approach calls upon architects to unify its constituent disciplines into a holistic, rigorous design method. The key

LETTING NATURE SEEP IN



Like a tree that falls in a deserted forest, if a building is designed according to the principles of "human-centered sustainable design" (HCSD), would anyone notice?

Part of the idea of HCSD is a kind of transparency that lets the natural world seep in. "Even though you're in the building, you can live a day in nature" by sensing the sun's movement, smelling outdoor air, and touching natural materials, says New York City architect Randolph Croxton. "And human-centered design is not just about the user: Another crucial part is the natural and human history of the site."

Working with the architect Cecil Baker & Associates and landscape architect Andropogon Associates, Croxton's firm put the principles of HCSD to the test for the city of Philadelphia's new Forensics Science Center, 46,000 square feet of pleasantly daylit laboratories in a 1920s school structure. With efficient M/E/P systems and numerous sustainable-design features—photovoltaics and low-VOC interior finishes, for example—the building is certainly green. But is it more "human-centered" than any other crime lab?

As the originator of the term HCSD, Croxton thinks so. But as HCSD is defined, only time will tell if it works. Its goals? "Productivity, well-being, and health are human-centered issues," he says. "These attributes are crucial to capture in wellness, learning, and work facilities, where you're really living your life inside the building." **C.C. Sullivan**

is to consciously and deliberately consider not only a building's technical needs but also the physical, psychological, and behavioral needs of the human beings within.

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BOB FALCON

global capitalism has also benefited some national economies, especially in Asian countries. Overall, however, its social and economic impacts have been disastrous.

The fragmentation and individualization of labor and the gradual dismantling of the welfare state under the pressures of economic globalization means that the rise of global capitalism has been accompanied by rising social inequality and polarization.³² The gap between the rich and the poor has grown significantly, both internationally and within countries. According to the United Nation's Human Development Report, the difference in per capita income between the North and South tripled from \$5,700 in 1960 to \$15,000 in 1993. The richest 20 percent of the world's people now own 85 percent of its wealth, while the poorest 20 percent (who account for 80 percent of the total world population) owns just 1.4 percent.³³ The assets of the three richest people in the world alone exceed the combined GNP of all least developed countries and their 600 million people.³⁴

In the United States, the wealthiest and technologically most advanced country in the world, median family income stagnated during the last three decades, and in California it even declined during the 1990s in the midst of the high-tech boom: most families today can make ends meet only if two members are contributing to the household budget.³⁵ The increase of poverty, and especially of extreme poverty, seems to be a worldwide phenomenon. Even in the United States, 15 percent of the population (including 25 percent of all children) now lives below the poverty line.³⁶ One of the most striking features of the "new poverty" is homelessness, which skyrocketed in American cities during the 1980s and remains at high levels today.

Global capitalism has increased poverty and social inequality not only by transforming the relationships between capital and labor, but also through the process of "social exclusion," which is a direct consequence of the new economy's network structure. As the flows of capital and information interlink worldwide networks, they exclude from these networks all populations and territories that are of no value or interest to their search for financial gain. As a result, certain segments of

societies, areas of cities, regions, and even entire countries become economically irrelevant. In the words of Castells:

Areas that are non-valuable from the perspective of informational capitalism, and that do not have significant political interest for the powers that be, are bypassed by flows of wealth and information, and ultimately deprived of the basic technological infrastructure that allows us to communicate, innovate, produce, consume, and even live, in today's world.³⁷

The process of social exclusion is epitomized by the desolation of American inner-city ghettos, but its effects reach far beyond individuals, neighborhoods, and social groups. Around the world, a new impoverished segment of humanity has emerged that is sometimes referred to as the Fourth World. It comprises large areas of the globe, including much of Sub-Saharan Africa and impoverished rural areas of Asia and Latin America. The new geography of social exclusion includes portions of every country and every city in the world.³⁸

The Fourth World is populated by millions of homeless, impoverished, and often illiterate people who move in and out of paid work, many of them drifting into the criminal economy. They experience multiple crises in their lives, including hunger, disease, drug addiction, and imprisonment—the ultimate form of social exclusion. Once their poverty turns into misery, they may easily find themselves caught in a downward spiral of marginality from which it is almost impossible to escape. Manuel Castells's detailed analysis of these disastrous social consequences of the new economy illuminates their systemic interconnections and adds up to a devastating critique of global capitalism.

The Ecological Impact

According to the doctrine of economic globalization—known as "neoliberalism," or "the Washington consensus"—the free-trade agree-

ments imposed by the WTO on its member countries will increase global trade; this will create a global economic expansion; and global economic growth will decrease poverty, because its benefits will eventually "trickle down" to all. As political and corporate leaders like to say, the rising tide of the new economy will lift all boats.

Castells's analysis shows clearly that this reasoning is fundamentally flawed. Global capitalism does not alleviate poverty and social exclusion; on the contrary, it exacerbates them. The Washington consensus has been blind to this effect because corporate economists have traditionally excluded the social costs of economic activity from their models.³⁹ Similarly, most conventional economists have ignored the new economy's environmental cost—the increase and acceleration of global environmental destruction, which is as severe, if not more so, than its social impact.

The central enterprise of current economic theory and practice—the striving for continuing, undifferentiated economic growth—is clearly unsustainable, since unlimited expansion on a finite planet can only lead to catastrophe. Indeed, at the turn of this century it has become abundantly clear that our economic activities are harming the biosphere and human life in ways that may soon become irreversible.⁴⁰ In this precarious situation, it is paramount for humanity to systematically reduce its impact on the natural environment. As then-senator Al Gore declared courageously in 1992, "We must make the rescue of the environment the central organizing principle for civilization."⁴¹

Unfortunately, instead of following this admonition, the new economy has significantly increased our harmful impact on the biosphere. In *The Case Against the Global Economy*, Edward Goldsmith, founding editor of the leading European environmental journal *The Ecologist*, gives a succinct summary of the environmental impact of economic globalization.⁴² He points out that the increase of environmental destruction with increasing economic growth is well illustrated by the examples of South Korea and Taiwan. During the 1990s, both countries achieved stunning rates of growth and were held up as economic models for the Third World by the World Bank. At the same time, the resulting environmental damage has been devastating.

In Taiwan, agricultural and industrial poisons have severely polluted nearly every major river. In some places, the water is not only devoid of fish and unfit to drink, but is actually combustible. The level of air pollution is twice that considered harmful in the United States; cancer rates have doubled since 1965, and the country has the world's highest incidence of hepaticitis. In principle, Taiwan could use its new wealth to clean up its environment, but competitiveness in the global economy is so extreme that environmental regulations are eliminated rather than strengthened in order to lower the costs of industrial production.

One of the tenets of neoliberalism is that poor countries should concentrate on producing a few special goods for export in order to obtain foreign exchange, and should import most other commodities. This emphasis has led to the rapid depletion of the natural resources required to produce export crops in country after country—diversion of fresh water from vital rice paddies to prawn farms; a focus on water-intensive crops, such as sugar cane, that result in dried-up riverbeds; conversion of good agricultural land into cash-crop plantations; and forced migration of large numbers of farmers from their lands. All over the world there are countless examples of how economic globalization is worsening environmental destruction.⁴³

The dismantling of local production in favor of exports and imports, which is the main thrust of the WTO's free-trade rules, dramatically increases the distance "from the farm to the table." In the United States, the average ounce of food now travels over a thousand miles before being eaten, which puts enormous stress on the environment. New highways and airports cut through primary forests; new harbors destroy wetlands and coastal habitats; and the increased volume of transport further pollutes the air and causes frequent oil and chemical spills. Studies in Germany have shown that the contribution of nonlocal food production to global warming is between six and twelve times higher than that of local production, due to increased CO₂ emissions.⁴⁴

As ecologist and agricultural activist Vandana Shiva points out, the impact of climate instability and ozone depletion is born disproportionately by the South, where most regions depend on agriculture and where slight changes in climate can totally destroy rural livelihoods. In

addition, many transnational corporations use the free-trade rules to relocate their resource-intensive and polluting industries in the South, thus further worsening environmental destruction. The net effect, in Shiva's words, is that "resources move from the poor to the rich, and pollution moves from the rich to the poor."⁴⁵

The destruction of the natural environment in Third World countries goes hand in hand with the dismantling of rural people's traditional, largely self-sufficient ways of life, as American television programs and transnational advertising agencies promote glittering images of modernity to billions of people all over the globe without mentioning that the lifestyle of endless material consumption is utterly unsustainable. Edward Goldsmith estimates that, if all Third World countries were to reach the consumption level of the United States by the year 2060, the annual environmental damage from the resulting economic activities would be 220 times what it is today, which is not even remotely conceivable.⁴⁶

Since money-making is the dominant value of global capitalism, its representatives seek to eliminate environmental regulations under the guise of free trade wherever they can, lest these regulations interfere with profits. Thus the new economy causes environmental destruction not only by increasing the impact of its operations on the world's ecosystems, but also by eliminating national environmental laws in country after country. In other words, environmental destruction is not only a side effect, but is also an integral part, of the design of global capitalism. "Clearly," Goldsmith concludes, "there is no way of protecting our environment within the context of a global 'free trade' economy committed to continued economic growth and hence to increasing the harmful impact of our activities on an already fragile environment."⁴⁷

The Transformation of Power

The Information Technology Revolution has not only given rise to a new economy, but has also decisively transformed traditional relation-

ships of power. In the Information Age, networking has emerged as a critical form of organization in all sections of society. Dominant social functions are increasingly organized around networks, and participation in these networks is a critical source of power. In this "network society," as Castells calls it, the generation of new knowledge, economic productivity, political and military power, and communication through the media are all connected to global networks of information and wealth.⁴⁸

The rise of the network society has gone hand in hand with the decline of the nation-state as a sovereign entity.⁴⁹ Embedded in global networks of turbulent financial flows, governments are less and less able to control their national economic policies; they can no longer deliver the promises of the traditional welfare state; they are fighting a losing battle against a newly globalized criminal economy; and their authority and legitimization are increasingly called into question. In addition, the state is disintegrating from within through the corruption of the democratic process, as the political actors—especially in the United States—depend more and more on corporations and other lobbying groups, which finance the politicians' electoral campaigns in exchange for policies that favor their "special interests."

The emergence of a vast global criminal economy and its growing interdependence with the formal economy and with political institutions at all levels is one of the most disturbing features of the new network society. In their desperate attempts to escape marginality, individuals and groups who have been socially excluded become easy recruits for criminal organizations, which have established themselves in many poor neighborhoods and have become a significant social and cultural force in most parts of the world.⁵⁰ Crime, of course, is nothing new. But the global networking of powerful criminal organizations is a novel phenomenon that profoundly affects economic and political activities around the world, as Castells has documented in great detail.⁵¹

While drug traffic is the most significant operation of the global criminal networks, arms deals also play a significant role, in addition to the smuggling of goods and people, gambling, kidnapping, prostitution, counterfeiting of money and documents, and scores of other ac-

ciated web sites. The culture we create and sustain with our networks of communications includes not only our values, beliefs, and rules of conduct, but also our very perception of reality. As cognitive scientists have explained, human beings exist in language. By continually weaving a linguistic web, we coordinate our behavior and together bring forth our world.⁷⁰

When this linguistic web becomes a hypertext of words, sounds, images, and other cultural expressions, mediated electronically and abstracted from history and geography, this is bound to influence profoundly the ways in which we see the world. As Castells points out, we can observe a pervasive blurring of levels of reality in the electronic media.⁷¹ As different modes of communication borrow codes and symbols from each other, newscasters look more and more like talk show hosts, trial cases like soap operas, and reports on armed conflicts like action movies, and it becomes more and more difficult to distinguish the virtual from the real.

Since the electronic media, and especially television, have become the principal channels for communicating ideas and values to the public, politics is played out increasingly in the space of these media.⁷² Media presence is as essential for politicians as it is for corporations and their products. In most societies, politicians who are not in the electronic networks of media communication do not stand a chance of gaining public support: they will remain simply unknown to the majority of voters.

With the blurring of news and entertainment, of information and advertising, politics becomes more and more like theater. The most successful politicians are no longer the ones with popular platforms, but those who come across well on television and who are adept at manipulating symbols and cultural codes. "Branding" candidates—i.e. making their names and images appealing by associating them firmly with seductive symbols in the viewers' minds—has become as important in politics as it is in corporate marketing. At a fundamental level, political power lies in the ability to use symbols and cultural codes effectively to frame political discourse in the media. As Castells empha-

sizes, this means that the power battles of the Information Age are cultural battles.⁷³

The Question of Sustainability

In the last few years, the new economy's social and ecological impacts have been discussed extensively by scholars and community leaders, as has been documented in the preceding pages. Their analyses make it abundantly clear that global capitalism in its present form is unsustainable and needs to be fundamentally redesigned. Such a redesign is now advocated even by some "enlightened capitalists" who are worried about the highly volatile nature and self-destructive potential of the current system. Financier George Soros, who has been one of the most successful gamblers in the global casino, has recently begun to refer to the neoliberal doctrine of economic globalization as "market fundamentalism" and believes that it is as dangerous as any other kind of fundamentalism.⁷⁴

In addition to its economic instability, the current form of global capitalism is ecologically and socially unsustainable, and hence not viable in the long run. Resentment against economic globalization is growing rapidly in all parts of the world. The ultimate fate of global capitalism may well be, as Manuel Castells puts it, "the social, cultural, and political rejection by large numbers of people around the world of an Automaton whose logic either ignores or devalues their humanity."⁷⁵ As we shall see, this rejection may already have begun.⁷⁶