

The Extravagant Gesture/

Nature, Design, and the Transformation of Human Industry

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If the landscape reveals one certainty, it is that the extravagant gesture is the very stuff of creation. After the one extravagant gesture of creation in the first place, the universe has continued to deal exclusively in extravagances, flinging intricacies and colossi down aeons of emptiness, heaping profusions on profligacies with ever-fresh vigor. The whole show has been on fire from the word go.
-Annie Dillard

Nature is nothing if not extravagant. Four billion years of natural design, forged in the cradle of evolution, has yielded such a profusion of forms we can barely grasp the vigor and diversity of life on Earth. Responding to unique local conditions, ants have evolved into nearly 10,000 species, several hundred of which can be found in the crown of a single Amazonian tree. Fruit trees produce thousands of blossoms-an astonishing abundance of blossoms-so that another tree might germinate, take root and grow. Birds, too, seem to have a taste for the extravagant: Who could say the wood duck's plumage is restrained?

For most of our history, the human response to the living earth, to particular places, has expressed the same flowering of diversity. Bearing the unique human ability to imagine and create, we entered the show and developed our own extravagant gestures. We built not just shelter, but beautiful, elegant responses to locale; the breathing, shade-providing Bedouin tent along with the ornate, aspiring temples of cool, coastal Japan. We designed not just wraps against the wind but tailored garments for ritual, celebration, and our own delight. We spoke and moved not just for utilitarian ends but to make drama and poetry, Balinese dance and Shakespearean verse-human creations stoking the fire.

Though human industry in the past 150 years has resorted to brute force rather than elegant design, commerce, too, could become a wellspring of creativity, productivity, and pleasure. Think of the thriving marketplaces that have enlivened the world's great cities, the cherished objects and materials that transform shelter into soulful dwelling. These need not be sacrificed to protect our forests, rivers, soil and air. Indeed, human industry and habitations can be designed to celebrate interdependence with other living systems, transforming the making and consumption of things into a regenerative force. Design can perform and preserve the extravagant gesture-in the marketplace, in the human community, and in the natural world.

An Age of Limits?

For many advocates of sustainable development the notion that the production and consumption of goods can be a regenerative force is not only alarming, it's downright

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heretical. Our age is widely perceived as an age of limits. The conventional wisdom holds that the rate of consumption of natural resources by the world's developed nations is damaging the Earth's ecosystems and consigning the Third World to poverty. While some industrialists still use brute force to gain short-term profits, many business leaders have come to realize that a system that takes, makes, and wastes is not sustainable in the long-term.

In response, we all try to limit our impact. We "reduce, reuse, and recycle" at home and in the workplace. Business leaders plan for reductions in resource consumption and energy use. They strive to "produce more with less," "minimize waste" and release fewer toxic chemicals into the air, water, and soil. These industrial reforms, which have come to be known as eco-efficiency, are an admirable attempt to come to terms with the conflict between nature and commerce—they may well help resolve it. But they don't really get to the root of the problem. Working within the same system without examining the manifest flaws in its design, eco-efficient reforms slow industry down without reshaping the way products are made and used. In effect, industry is simply using brute force more efficiently to overcome the rules of the natural world.

Using fewer resources, people may feel a bit "less bad," but no one can quite slip the trap of being merely a "consumer" in a world of poorly designed, toxic products. Every choice seems to contribute to the erosion of human and environmental health: the carpet makes your children sick; the car burns fossil fuels; the TV is loaded with toxic materials. When anything you buy does damage to the world, consumption remains freighted with anxiety and divorced from any notion of sustaining vision that celebrates pleasure, abundance and delight.

Industry, meanwhile, slogs ahead under regulations that merely dilute pollution rather than examine the cause of the problem; too often these rules are in fact signals of design failure and, ultimately, licenses to harm. And efficiency is proving to fall short of its goals. A new report from the World Resources Institute, for example, announced that pollution and waste in Austria, Germany, Japan, the Netherlands, and the United States have increased by as much as 28 percent in the last 25 years despite increasingly efficient use of resources. Though Europe in the past 10 years has achieved significant reductions in waste, it is merely reaching for sustainability, which is after all only a minimum condition for survival—hardly a delicious prospect.

In this atmosphere, the World Business Council for Sustainable Development, a leading advocate of eco-efficiency, found "sustainable consumption" such a burdened, contested term it dropped the word from the title of its four-year study on, well, sustainable consumption. As Ken Alston, a former WBCSD project member said, the group's leadership—executives from major multinational corporations—"struggled to develop eco-efficiency arguments supporting sustainable production and consumption strategies that were robust enough to withstand a critique from environmentalists."

Yet a vision for healthy, sustaining commerce does exist. The idea that the natural world is inevitably destroyed by human industry, or that excessive demand for goods and services causes environmental ills, is a simplification. Nature—highly industrious, astonishingly productive, extravagant even—is not efficient but effective. Design based on nature's effectiveness, what we call eco-effective design, can solve rather than alleviate the problems industry creates, allowing both business and nature to be fecund and productive.

Nature's Abundance

How is it possible for industry and nature to fruitfully co-exist? Well, consider the cherry tree. Each spring it produces thousands of blossoms, only a few of which germinate, take root and grow. Who would see cherry blossoms piling up on the ground and think, "How inefficient and wasteful"? The tree's abundance is useful and safe. After falling to the ground, the blossoms return to the soil and become nutrients for the surrounding environment. Every last particle contributes in some way to the health of a thriving ecosystem. Waste that stays waste does not exist. Instead, waste nourishes; waste equals food.

As a cherry tree grows, it enriches far more than the soil. Through photosynthesis it makes food from the sun, providing nourishment for animals, birds and microorganisms. It sequesters carbon, produces oxygen and filters water. The tree's limbs and leaves harbor a great diversity of microbes and insects, all of which play a role within a local system of natural cycles. Even in death the tree provides nourishment as it decomposes and releases minerals that fuel new life. From blossom to sapling to magnificent old age, the cherry tree's growth is regenerative. We could say its life cycle is cradle-to-cradle-after each useful life it provides nourishment for something new. In a cradle-to-cradle world-a world of natural cycles powered by the sun-growth is good, waste nutritious, and nature's diverse responses to place are the source of intelligent design.

Industrial life cycles, on the other hand, tend to be cradle-to-grave. Typically, the production and consumption of goods follows a one-way, linear path from the factory to the household to the landfill or incinerator. Wasted materials and harmful emissions trail products from the cradle of the industrial plant to the grave of the local dump, where products themselves are thrown "away" or burned for energy. Recycling and regulation are often employed to minimize the negative impacts of industry and they do help ease the conflict between nature and commerce. But why not set out, right from the start, to create products and industrial systems that have only positive, regenerative impacts on the world? Why fine-tune a damaging system when we can create a world of commerce that we can celebrate and unabashedly applaud?

Commerce worth applauding applies nature's cycles to the making of things. It generates safe, ecologically intelligent products that, like the cherry tree, provide nourishment for something new after each useful life. From a design perspective, this means creating products that work within cradle-to-cradle life cycles rather than cradle-to-grave ones. It means rather than designing products to be used and thrown away, we begin to imitate nature's highly effective systems and design every product as a nutrient.

What is a nutritious product? It's not simply an all-natural product; it's not a recycled product, either. Instead, it's a product designed to provide nutrients to what we have conceived as the Earth's two discrete metabolisms, the biosphere-the cycles of nature-and the technosphere-the cycles of industry. Lightweight food packaging, for example, can be designed to be a nutritious part of the biological metabolism; if it is made of organic compounds it can be safely returned to the soil to be consumed by microorganisms. Synthetic materials, chemicals, metals and durable goods are part of the technical metabolism; they can be designed to circulate within closed-loop industrial cycles, in effect, providing "food" for the technosphere.

Cars, computer cases, washing machines, televisions-in fact, all industrial products-can be designed to retain value as they flow between producer and consumer. Instead of being recycled, or downcycled, into lower-quality materials,

products created and used within closed technical cycles-what we call products of service-can continually circulate as high-quality products. Customers will soon be able to buy the service of such goods, and manufacturers will take them back at the customers' request, using their complex materials in the product's next high-value iteration.

When products from either the biosphere or the technosphere take a one-way trip to the landfill a great wealth of nutrients is squandered. Trapped in a plastic-lined dump, organic waste cannot renew the soil and valuable technical materials are lost forever. Worse, the two discrete metabolisms are mixed, contaminating both spheres: Nature, by design, cannot safely absorb the materials of industry and the technosphere has little or no use for organic nutrients. But if the things people make are channeled into one or the other of these metabolisms, then products can be safely manufactured and consumed without straining the environment. They can be considered either biological nutrients or technical nutrients, both of which provide nourishment within their respective spheres of nature and industry.

Our strategy is quite different from the strategy of dematerialization. Proponents of dematerialization aim to reduce the amount of a resource used to create a product. They want to make thinner paper, lighter packaging, a better aluminum can-in this world, less is more. While those innovations may lead to a more efficient use of materials, they do not comprehensively examine the chemistry of materials, the impacts of industrial processes, nor the local circumstances surrounding their use-which may well be quite harmful to both people and nature.

We are proposing something different. We'd like to see a true transformation of commerce in which design goes beyond using nature efficiently and instead creates value and opportunity with products that nourish rather than deplete the world. This is not to gainsay efficiency. We'd simply like to put efficiency to work in the service of an effective, life-centered vision. As the business genius Peter Drucker has said, being efficient-doing things right-is the crucial role of the manager. It's the leader's job to be effective, to see that the "right things get done." Efficiently managing a toxic system is not the "right thing." Efficient innovations within a life-affirming design protocol, however, suggest a dynamic path to a cradle-to-cradle world.

From Maintenance to Renewal to Inherent Creativity

The conceptual, and actual, shift to cradle-to-cradle products transforms the impact of industry. When all manufactured products and materials are designed as nutrients, the production and consumption of goods enriches the natural world. And when those nutrients flow within coherent cycles, human industry and human desires can become the cherry tree, writ large.

Fanciful? Not at all. Many notable leaders of companies all over the world have begun to move from the maintenance of the old industrial system to a renewal of commerce. They have decided to recognize the far-reaching influence of their creative acts and celebrate their impact on the world rather than disguise it. They have launched the Next Industrial Revolution.

In fact, it's already well underway. As early as 1993, the textile industry, led by the Swiss firm Rohner and the textile design company DesignTex, had already developed examples of a textile that is a biological nutrient-a product so safe you could literally eat it. The carpet industry, meanwhile, has adopted the product of service idea and is focusing its business on the concept that carpet can be a technical nutrient retrieved again and again from loyal customers.

Both are working to keep their respective materials in coherent, truly cyclical flows.

Companies such as Milliken, Collins & Aikman, and Interface-major commercial carpet companies-are all putting forward their products as materials designed for reclamation. They are telling their customers they want to replace used carpets with new ones and retrieve their technical nutrients. In effect, the companies continue to own the carpet material but lease and maintain it while a customer uses the carpet in their building. Eventually the carpet will wear out like any other, and the manufacturer will reuse its materials in new carpets.

It's important to note, however, that many carpets on the market contain such questionable, potentially toxic materials such as PVC and heavy metals, which cannot be truly "recycled," and are instead shredded and blended into what we call a downcycled material of lower quality-a nylon reinforced PVC mesh, for example. Our strategy would imply a redesign of the industry so that carpet materials would maintain their high quality over many useful lives in the technical metabolism.

The chemical company BASF, for example, has recently announced a new fiber called Savant[®], which is made from an infinitely recyclable nylon 6 fiber. Savant[®] is inherently stain resistant, inherently colorfast-no need for Scotchgard-and designed to be taken back to its constituent resins to become new material for new products. In fact, BASF can retrieve old nylon 6 and transform it into an improved fiber, upcycling, rather than downcycling an industrial material. The nylon is rematerialized, not dematerialized-a true cradle-to-cradle product. On the heels of BASF, manufacturers of everything from running shoes to automobiles are designing and implementing new ways to retrieve and circulate valuable materials.

DesignTex, on the other hand, has created an upholstery fabric that flows in the biological metabolism. The company set out to create a product that was beautiful, durable, and ecologically intelligent. After an assiduous design process with the Swiss textile mill Rohner they decided on a wool-ramie blend that could be removed from the frame of a chair after its useful life and tossed onto the ground to naturally decompose. To ensure that the fabric would safely biodegrade, the design team considered more than 8,000 chemicals used in the textile industry to finish and dye natural fabrics. Most contained some form of mutagen, carcinogen, heavy metal, endocrine disruptor, or bio-accumulative substance, but 38 were found to be suitable for a material destined to be food for the soil.

It was a pleasing outcome: a gorgeous, affordable fabric that would one day be mulch for the local garden club. But the design process also yielded another very positive, if unintended, effect. When regulators tested the effluent from the Swiss mill that produced the DesignTex fabric, they thought their instruments were broken. They tested the influent to check their equipment and found that it was working fine-the water coming out of the factory was as clean as the water going in. The manufacturing process itself was filtering the water.

The Creation of Community Wealth

A textile mill that purifies water begins to suggest the profound impact intelligent design can have on communities. Just as a product designed as a biological nutrient nourishes a community of microorganisms in the soil, a factory and its manufacturing processes can be designed to address a broad range of local concerns, from the desire for a convivial, productive workplace to the health of the environment to the creation of community wealth.

Design creates an environment for a community. A factory designed to nourish a community of workers, for example, can build stronger ties between colleagues by creating pleasant, healthy places for them to work, meet and enjoy each other's company. That's a laudable intention for workplace design. But it cannot be the only intention. The work community extends beyond the workplace and includes all species that inhabit the locale-not just the human community, but all species. When designers are mindful of all species, their goals change dramatically. Suddenly, the availability of sunlight, shade and water; the subtleties of climate and terrain; the health of local birds, flowers and grasses all become fundamental to design. Buildings become responsive to place.

Herman Miller, the furniture manufacturer, took that principle to heart when it commissioned the design of a 295,000 square foot factory and office near its headquarters in western Michigan. The company's goals for the new plant were to foster a spirit of collaboration between office and factory workers, and create a workplace with a restorative impact on the local environment. Working with a design team that paid close attention to local conditions, Herman Miller built a plant that serves the needs of all its factory workers and administrative employees by celebrating an array of natural and cultural delights.

The low-lying, curved building follows the natural contours of the Michigan grassland. Stormwater spilling off the building moves off the site through an extended series of wetlands that purify the water while providing habitat for hundreds of species of birds, plants and insects. Plantings of native grasses and trees provided additional habitat for local creatures and further enhance the beauty of the site. Inside the building, offices face the manufacturing plant across a sun-lit, urbane promenade where workers meet and lunch and drink coffee among whimsical sculptures and thriving plants. The entire building-the gyms, the bathrooms, the factory floor-is so pleasantly bright and airy, it is now known as "the greenhouse."

Does this enhance the well-being of workers? Create productivity and wealth? Well, yes. When Herman Miller moved into the building the company was producing \$250 million worth of furniture each year. Within a single year it increased production by nearly \$50 million with the same number of employees, a gain of 24 percent. At the same time, both office and manufacturing staff reported a significantly higher degree of job satisfaction than they had at their previous workplace.

Herman Miller credits these positive changes to three things: The customized design of the factory, which suited their administrative and manufacturing needs; their innovative management strategy designed to enhance relationships with customers and employees; and the simple fact that the building is such a bright, pleasant place to work.

While it's impossible to measure the influence of delight, it's easy to imagine the pleasure of working in a place where you can always see the beauty of the surrounding landscape, where copious fresh air and light actually blur the boundary between indoors and out. Workers in such a place feel as if they have spent the entire day outdoors. They see the comings and goings of birds and the passing of the seasons. They come to know the place where they live during their days at work.

Such pleasures have an enormous impact on the spirit. After Herman Miller moved into the new plant, sixteen young employees left for jobs with higher wages. But they soon returned. When the president of the company asked, "Why

are you back?" they said, "We want our jobs back because we had never worked in another factory before. We couldn't work in the dark."

When a company decides to create a workplace where employees can develop an appreciation for local natural beauty, it has given itself the opportunity to re-think everything under the sun; it is making a decision that will ripple through all its endeavors and through the life of the community it inhabits. It is, in effect, making a profound declaration: we are native to this place. For Herman Miller that meant building a workplace that embodied a new way of thinking about its role in the world. For other companies, for the giants of the Industrial Age, it means staying put, re-inventing themselves and restoring the sites where they have done business for years.

One of those icons of industry, [The Ford Motor Company](#), has launched one of the most sweeping acts of industrial restoration ever. Led by Henry Ford's great grandson, William Clay Ford, Jr., the company has embarked on a 20-year, \$2 billion dollar restoration of its gigantic [Rouge River plant in Dearborn, Michigan](#). Built between 1917 and 1925, the manufacturing complex remains one of the world's largest. At its peak it employed 100,000 workers and churned out millions of cars (boats and airplane engines, too). It was the pride of Ford and the envy of industrialists from Tokyo to Berlin.

Yet, it became a place where workers and management alike worked in the dark: Many of the laborers toiled without seeing the light of day, and management designed and operated products and manufacturing systems with little regard for the natural world. By the beginning of the 21st century, the Rouge River plant was a brownfield, a sprawling wasteland of dilapidated buildings, leaky pipes and old equipment. The land was contaminated, bare of all but the most persistent vegetation, and the river was badly polluted.

Ford Motor could have decided to fence-off the site and build a new factory where land and labor are cheap. Instead, it declared itself native to Dearborn, Michigan. Rather than walk away from a worn-out industrial landscape and a community that had supported it for nearly a century, Ford chose to transform the Rouge River site into a healthy, productive, life-supporting place. Indeed, Ford's leaders are now asking a revolutionary question: When will we be able to let our own children play in the soils and waters of the Rouge?

That critical question leads to a wide spectrum of inquiry. How do we design a manufacturing facility that is a prosperous, supportive work environment? What specific innovations will make the site a place that invites the return of native species? How can the presence of the factory be beneficial to the Rouge River? On the grounds of the site what is the optimum depth of topsoil, number of worms per cubic foot and insect and bird diversity? What are the optimum aquatic populations of the river?

These may sound like surprising questions for a car company to ask, but Ford is asking them-and answering them, too. Construction began in November 2000 on a new automotive assembly plant that will feature skylights for daylighting the factory floor and a roof covered with growing plants. The 450,000 square foot "living roof" will provide habitat for birds, insects and microorganisms. In concert with a series of wetlands and swales, the roof will also control and filter stormwater run-off. With these natural, built-in measures replacing the expensive technical controls called for by new regulations, Ford stands to save between \$8-35 million on stormwater remediation alone.

Over the course of twenty years-over the course of generations, really-Ford will restore their Rouge River site. In addition to the living roof and the ponds and swales, grasses and other plants will be used to rid the soil of contaminants. Porous paving will filter water through retention beds to further control stormwater run-off. Thousands of trees will be planted to provide habitat for songbirds and, one hopes, beautiful, shady places for the children of Dearborn, Michigan to play.

These are the kinds of innovations that a manager devoted to efficiency might reject out of hand-too extravagant, too costly. Yet Henry Ford himself, who revolutionized industry with ever increasing levels of efficiency, would probably have found this an exciting prospect. A plan that invited the return of native species while saving \$35 million over conventional engineering, with a delightful landscape thrown in for free, is exactly the kind of cost-effectiveness he would have looked for and insisted on.

As his great grandson William Clay Ford says, "this is not environmental philanthropy; it is sound business..." And he's right of course. Businesses that fail to bring ecological and social concerns to commerce put shareholder value in danger and are not contributing to the larger prosperity. That's why, along with restoring the Rouge River site, Ford is re-thinking everything from the materials used in the production of cars to the design of its manufacturing systems.

Indeed, one could re-imagine some of the very tenets on which the auto industry has done business for the past 100 years. Bill Ford himself says that the company is no longer simply in the business of building and selling cars and trucks. Instead, they might be in what we call "the personal mobility business." To us this means the auto industry is preparing to design cars as products of service rather than sell them to individual owners. Customers would effectively buy the use of a car for their personal mobility needs for an hour, a day, or a year while the mobility company would provide maintenance and other services. The company would be responsible for their cars forever and would benefit from their valuable materials. A car, in this context, becomes a truly long-term material asset rather than a relatively short-term material liability, and the need to mine the world for raw materials becomes an archaic expression of the industrial age.

That's what separates this from typical leasing: our consulting firm is working with auto manufacturers who are beginning to imagine building cars that can be completely disassembled and reused. They want to develop everything from new polyesters and paints that retain quality through reclamation to compostable upholstery fabrics that will feed and restore the soil. In the terms of the next industrial revolution the companies are building a coherent system of closed-loop cycles flowing with technical and biological nutrients.

This is revolutionary. And this lengthy discussion of Ford Motor has simply been to illustrate that the transformation of commerce is already well underway: When an industrial giant with more than \$80 billion in purchase orders sends signals such as these to its competitors, its customers, and perhaps most significantly, into the supply chain, one can begin to imagine a wide range of rippling, far reaching effects; one realizes that the world is changing.

A New Global Perspective

The fact that a global company can achieve positive local effects is a very critical issue for us. In our minds, all sustainability is local. On one level, that suggests a rich engagement with one's place, an attitude toward design that

draws information and inspiration from the nearby living world. But it can also mean that one develops an appreciation for the distant effects of local actions, and the local effects of distant actions.

When the leader of a large corporation, for example, examines her company's role in the world, she might do so from the narrow perspective of her office. Or she might see that when her decisions initiate labor and create products well beyond her region, they have an impact on a distant place that can only be understood in its local context; what is sustainable in LA may not be sustainable in Kerala-or even in New York. An executive might do nothing with this knowledge, or if she aspires to a sustaining vision, she might begin to take many places into account in her decisions and, in fact, even seek to enrich many places.

Former World Bank economist Herman Daly has approached this idea from a global economic perspective. He makes a distinction between globalization, a system of uniform rules for the entire world, and internationalization, the increasing importance of relations and trade between nations. While internationalization preserves the identities of nations as it embraces international commerce and communications, in a globalizing economy, says Daly, "what was many becomes one."

From a design perspective, a set of uniform rules for the entire world suggests an erosion of cultural diversity. Applying one-size-fits all design solutions to architecture, for example, yields bland, uniform buildings isolated from the particularities of place-from local culture and nature, from energy and material flows. Such buildings, quite common today in cities and office parks all over the world, reflect little if any of a region's distinctness or style, its unique, often extravagant expressions of humanity.

Consider French cheese. Charles DeGaulle is said to have remarked that it was difficult to rule a country that produced 2000 different kinds of cheese. But should political efficiency overrun diversity? What if the many cheeses of France were to become one? Perhaps that's why the French farm activist Jose Bove used his tractor to dismantle the McDonald's in his village: for some reason, the thought of such a France seems to have been just too much to bear.

But there's a flip side to the global economy-international trade allows us to experience and celebrate the fullness and diversity of life on Earth. Isn't it to be expected that one might go to a place like New York to sample the delicacies of Italy and China and Istanbul, all of which are the result of intensely local events? Who would choose to live without Parma's cheeses and hams?

Not the members of Slow Food, an Italian movement working to preserve regional culture with the tools of the global economy. Employing what the movement's founder Carlo Petrini calls "virtuous globalization" -a savvy use of global communications to identify international markets for local food producers-Slow Food, writes author Alexander Stille, "has taken up the defense of the purple asparagus of Albegna, the black celery of Trevi, the Vesuvian apricot, the long-tailed sheep of Laticauda...and a host of endangered handmade cheeses and salamis known now only to a handful of old farmers."

With the help of Slow Food's commercial ventures-a guide to local wine and restaurants, a biennial food show-Italian farmers, beekeepers, millers and vintners are staying in business. A once struggling miller in the small town of Bra, for example, now has all he can do to keep up with orders for his flour and may soon be grinding grain for the food retailer Williams-Sonoma. That's the beauty of Slow Food: a global

network that produces local wealth through a celebration of the pleasures of fine food.

Corporations could also practice virtuous globalization. They might begin by designing products, manufacturing systems and workplaces that fit locale. Imagine a global company creating value by applying a high international standard of scientific inquiry—a common tool of corporate research—at the local level, addressing basic needs like nutrition, soil chemistry or clean water. A prototypical product of consumption such as soap might allow them to do so.

Currently, soap is mass produced and shipped all over the world in a one-size-fits-all solution to a common need. Detergents are designed to lather up, remove dirt and kill germs anywhere from Brooklyn to Bangkok. Rather than respond to the different washing methods and water chemistries that occur from place to place, manufacturers simply add more chemical force to override local conditions.

That's hardly a benign choice. Though detergent makers proudly announce that their products are "phosphate free," they are not free of other harmful chemicals. The industrial strength required to make a soap work against any contingency makes even a small dose of detergent a potent pollutant. In combination with other effluents in the waste stream, detergents flow into the watershed, diluted but far from safe. The health of rivers and streams, the lives of fish and aquatic plants, the quality of drinking water all take a beating.

There is another way to satisfy the need for clean water and clean clothes. Rather than impose a universal product on markets all over the world, a soap manufacturer might apply sophisticated technology and expertise in chemistry to the development of detergents that are not only safe everywhere, but designed to address the specific needs of ecosystems and deliver nutritious effects to a variety of locales. Soaps for hard water, soaps for soft water, soaps for washing clothes on riverside rocks—even nutritious soaps. Detergents could also be locally produced, providing meaningful local employment, and sold in biodegradable packaging designed to be food for the soil, or in cookie-sized discs, eliminating packaging altogether.

With these innovations, growing organically out of years of research and development, the global company would have developed a product suitable to locale, designed out dangerous chemicals, built an effective delivery system, eliminated waste, protected local waters from pollution and provided food for local soils. Not bad for laundry detergent.

Many products of consumption are ripe for innovations that will have positive impacts on communities all over the world. A packaging manufacturer could design a biodegradable food container for markets in China, where the disposal of Styrofoam has become a national problem. In India, where waste is often burned for fuel, plastic beverage bottles could be produced with new polymers that would replace dangerous toxins—such as the heavy metal antimony—that are commonly released when incinerated. In fact, polymers produced without antimony have already been designed and offer promising new alternatives in the global marketplace.

In Praise of Dirty Clothes: Design and the Renewal of Everyday Life

If we look at things as simple as soap and water in the context of the daily life of a community, we can begin to see some of the delightful, far-reaching effects of a cradle-to-cradle world.

Imagine for a moment a community that wants to re-invent itself. After an arduous but exciting round of public

meetings, the town's citizens have decided that they want to renew the community's connection to the natural world while restoring the best qualities of a healthy small town. Along with planning to preserve a vibrant commercial district, mixed-use neighborhoods, walkable streets and lots of parks and playgrounds, the town has also identified the need for a variety of new social venues. Many of these new venues, it is hoped, will bring the generations together in places that provide a pleasing experience of nature during the daily round of errands and chores. In effect, the community wants to take down the fence between commerce, local culture and the natural world.

One of the new venues is a community service center operated as a viable business by retired people. The center is comprised of a laundromat, a day care, a health clinic and a mobility service. It is right on Main Street in the old railway station which now incorporates new technology to create energy systems powered by the sun, earth and wind. In fact, high-tech glass, daylighting, photovoltaic panels, and a remote wind turbine in a wind farm off-shore allow the house to operate without a drop of fossil fuel. In a series of indoor botanical gardens and outdoor ponds, wastewater and stormwater treatment is also managed on-site.

Along with the energy and water treatment systems, the old station has received another new addition: a two-story meeting place lit by the sun, a kind of greenhouse commons where elders and infants, parents and teenagers gather at the hub of the neighborhood center. While mothers sit and talk over coffee, enjoying the view of the big, old streetside oaks, a pair of older men relax in the warm sun while waiting for their appointments at the clinic. Others wait to catch the elevator to an underground garage, where a small fleet of community cars is parked.

The community cars are products of service built from reclaimed materials and powered by fuel cells. They are operated by elderly people, who drive around town dropping children at the middle school athletic field, picking up groceries or laundry, and ferrying people to and from their appointments at the health clinic. The fleet allows most people to keep their cars off the road while giving the community car drivers opportunities to be involved in community life.

Back at the laundromat, business is brisk and profitable. Most people in the community have chosen not to wash, dry and iron their own clothes; they have decided its cheaper, takes up less of their time and is perhaps more ecologically intelligent and socially useful to have their laundry picked up, washed and delivered each week. So the washing machines are humming-humming with energy provided by the sun and cleaning clothes with detergent that is not simply phosphate-free but completely harmless to the natural world. After each wash, wastewater spills into the indoor botanical gardens-creating heat-and then flows outdoors through a constructed wetland, in each case providing food for local flowers and plants. By design, the community center has become a fecund habitat. Like a tree it makes oxygen, sequesters carbon, fixes nitrogen, purifies water, makes complex sugars and food, and creates a restoring environment where the generations meet.

From the folding tables in the laundromat, the views are gorgeous. An elderly gentleman gazes out over the hilly town and after folding a pile of clothes, carries a stack across the commons to the day care center, where he pauses to watch his grandson play outdoors with the other neighborhood children. He is aware, in the midst of a simple chore, that he lives in a place blessed with an abundance of community wealth and that he contributes daily to its growth.

This is just one example of the many ways in which eco-effective design can transform the experience of everyday life. It suggests how seemingly extravagant gestures—a beautiful social venue for the eldest and the youngest, botanical gardens for purifying water—can add up to a deep sense of community wealth.

Set in the world most of us live in today, such a scenario is shot through with things we might lament, from the impact of fossil fuel burning automobiles to the pollution of our rivers and streams to the clear sense that today's industrial strategies will never deliver a high standard of living to all the world's people. We might also ask, given the promise of ecological design, new technologies, and the sensible solutions they enable, why these strategies of change have not been more quickly adopted. Obviously, transformations of the scale we are proposing are not simple. The development and wide adoption of new products, markets, and material flow systems does not happen overnight, nor without the commitment and energy of leaders from every sector of society. We could imagine this as a long, arduous process. Or we can see that changes of this magnitude, sparked by human need and ingenuity, are a theme of history. As Sheik Yamani, Saudi Arabia's OPEC minister pointed out during the first so-called energy crisis, the Stone Age didn't end because we ran out of stones. Human ingenuity responds to the historical moment, and the age of ecologically intelligent design will emerge long before we run out of oil. We believe that it will fully emerge in a cultural shift driven by the engine of commerce, as the values embodied in intelligent design become embedded in the activities of our daily lives. We need only observe the computer revolution to see how quickly technology and economics can make the impossible commonplace. And the shift toward ecological values is already underway. When it becomes widely known, for example, that one of the world's major corporations has chosen to purify stormwater with wetlands and a living roof, and in the process saved \$35 million, both business leaders and the culture at large will begin to see the economic viability of ecological design. Once the regulatory infrastructure catches up with designs such as these—designs so inherently productive and safe they don't require regulation—the regulatory agencies will start to use them as benchmarks, presenting them within the culture as strategies that are hugely attractive from the perspective of both the carrot and the stick.

Perhaps just as important, the changes we are proposing allow all of our children a story of hope. Seeking a hopeful future, the tragedies we see will spur many of us to imagine solutions. At first, we may simply try to be free of something we know is harmful, such as chlorine or lead. As we begin to know more about the products we buy, we might make choices about the kind of carpet or mobility system we use based on as much scientific knowledge or personal experience as we can muster. Designers engaged in this transformation would begin analyzing the materials in products and replacing harmful chemicals with more benign ingredients. Other products would be designed only from materials fully defined as safe biological or technical nutrients. And at the highest level, designers would begin to develop systems to assemble products in ways that allowed for their coherent, cradle-to-cradle flow within the technical and biological metabolisms.

These changes are within our grasp. Indeed, they have already begun. Innovations in architecture and community design are being employed all over the world. The revolution in product design is well underway. And as we begin to realize the fruits of our efforts today's laments will become celebrations of a world in which people and nature thrive

together-abundantly, delightfully, extravagantly....hopefully.

ENDNOTES

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