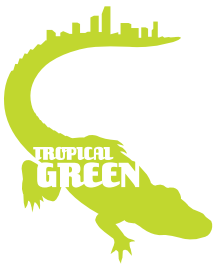


“Design as the First Signal of Intention”

William McDonough

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The first Tropical Green Conference, organized by *Metropolis* and Zyscovich, Inc., and sponsored by Shaw Contract Group, Ultron, Haworth, and Carnegie, was held on February 9-10, 2006 at Miami Dade College, Wolfson Campus. These remarks were delivered as a keynote by architect William McDonough. Look for Tropical Green II: Workshops, returning to Miami soon.

Susan S. Szenasy, Metropolis editor in chief: I met Bill about 20 years ago. He was building rooftop structures in Manhattan, beautiful little houses in the sky. He was the first architect, the only architect, who ever talked to me about something called true north. He was orienting his buildings to capture the sun; he understood architecture’s connection to earth and sky. Of course I was very impressed by Bill and wrote the story. Now, every time I get a chance to hear him lecture I am there in a second because I know I am going to be inspired and reaffirmed in my commitment to sustainability.

William McDonough: It’s hard to believe it’s been twenty years. It feels like yesterday, we were wandering around, going like this [waving arms]. Does anyone in this room know how to find true south? One. Oh boy. Two. Ok, remind me to tell you how to do that. Tonight I am going to talk about design as the first signal of intention. I think at this point in our history we have to ask ourselves, “What is our intention as a species?” If we look at the question of dominion and stewardship, we realize that stewardship is implicit in dominion because how could you dominate something you’d killed? And dominion is implicit in stewardship because how could you steward something you couldn’t dominate? The fundamental question goes all the way back to the ancient Hebrews of the original Bible, and St. Jerome translating it from the vulgate into Latin. The word that became “dominion” could be translated as “stewardship” yet it could also be translated as “kinship”. It’s interesting that what we call our natural resources, a native person calls their relatives.

The notion that we would find ourselves in kinship with the natural world



William McDonough

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is what I'd like to talk about tonight. It doesn't mean looking at nature as capital. It's not looking at nature as if it's this perfect thing separate from humans. It's looking at humans and asking, at what point do humans become the capital of nature? When do we find ourselves a tool of nature, not just using nature as our tool? When we stop and connect ourselves to other species we realize at a granular level, we've known about the fundamental problems of human artifice, for my generation especially since the publication of Rachel Carson's *Silent Spring* 1962. In *Silent Spring*, with its astonishingly poetic title, the idea that the birds have gone sends shivers down your spine. It has to make you wonder that if 99% of the meadowlarks are gone it means your children will never hear a meadowlark. Does that matter? It matters to me. The question about whether the birds are even singing, the ones that we have, is a serious question.

What would our designs look like if we cared? In fact at this point in our development as a species, what is a bird anyway? Take the rubber duck. In California there is a rubber duck that comes with the following warning: "this product contains substances known by the state of California to cause cancer and birth defects or other reproductive harm." What kind of species would produce this kind of species? Can you imagine that we make it, we label it, and then we give it to our children to put in hot water and suck on? At what point do we begin to understand this? A parent standing in a cancer ward with their child would do anything to see that child not have cancer. I've been in oncology wards where the parents actually walk out of the program where their kids are in chemotherapy to go outside and smoke a cigarette. Explain this to me. What is it about our species that would allow us to even make such a thing? Well, it is design.

If design is a sign of human intention then what are our intentions? What is our intention as a species? The question that we must ask when we start designing is: how do we love all the children of all the species for all time? Amazing things start to happen when you do this. It sounds a bit loopy when we sit down with the engineers and talk about love. But it's amazing how human humans are in the end. We've run across seven distinct kinds of people. The first are people who say, "I am going to change my life, this is what I want to do with my whole life." They are usually younger or retired. The second are people who go, "I love this. I am going to do everything I do this way." That's exciting too. There are people who say, "I love this and it's my job to do this. I have to do my job, so I do my job willingly." There are people who say, fourth, "I could care less, but it's my job so I'll do it." The fifth are people who say, "I don't really understand this and it's disturbing my daily, peaceful rituals. I'm getting ready to retire, I know why I should change everything I do, but it's my job so I'll do it. Get on with it." And then we get the sixth; they're the people who really don't like it. It disturbs them. It causes them to think. It must hurt to think, we've discovered. But they really don't like it. They are going to try to deep six it, as soon as they can, but they're not going to let anyone know they're doing this because it's their job and they'd get in trouble if they let anybody know. We call them the sixes. Then there are the sevens and they are actively aggressive and find it totally annoying and aren't afraid to tell you to your face. We work with a lot of sevens and we really enjoy them

because they strengthen us. They give us fortitude. When they become ones they're really powerful, which happens.

I remember going into Ford Motor where we've had the pleasure of designing a building with the world's largest green roof. When I walked into the room with my counterpart, a plant engineer who was going to execute the project, he started out by saying, "I'm not here to talk to any eco-architect about some eco-architecture, and here at Ford we tar over skylights. Now what's this I hear about a green roof?" This is the opening gambit. I remember thinking, "I love this guy! This is perfect!" This is exactly who we need because it grounds us and then we move on. Jay and I now work together, he works for McDonough Consulting. It's exciting. Because such people become champions and this is the kind of question we get into: do you love your children? And all of a sudden the metric for soil testing at the Rouge plant became focused on the question: "at what point would we allow all our children to play there?" That's when we've done. It wasn't parts per billion. It was just how well can we love our children if they can't play.

In order to do get to this point we need to have a goal. Our goal is a delightfully diverse, safe, healthy, and just world with clean air, water, soil and power—economically equitable, ecologically and elegantly enjoyed. What part of this don't you like? I got to present this at the White House, twice. I just presented it for the second time in three years, for the Bush administration's Office of Management and Budget. Three years ago I was asked by someone from the Department of Energy—it was a command performance, federal executive order, you had to be there—"What do you think of clean nuclear power?" I said, "I love nuclear power. I love clean nuclear power. I am especially fond of fusion. I think we should spend trillions of dollars immediately on fusion capture. And thank God, literally, we already have our reactor, the sun, exactly where we need it 93 million miles away."

If we look at the design that we currently have we find out that there are all kinds of tragedies, tortures, and tyrannies that are all of our own making. We say that they are not part of our plan. Climate change, ocean acidification, persistent toxifications, polymers in the Pacific Gyre, one thing after another, we say they are not part of our plan. I didn't come here tonight planning to cause global warming, but I did. It is part of our de facto plan, it is the thing that is happening because we have no other plan. If we allow these tragedies to occur we become strategically tragic. We have a strategy of tragedy. It's because we don't know what game we're playing. If you're playing chess and you don't know you are supposed to go for checkmate, how do you play chess? You're just moving pieces.

If our goal is climate change, we're doing great. If our goal is destruction of aquifers, we can't do much better than we're doing. So the question becomes, "what is your intention?" Because if you didn't intend for that, then why should we celebrate our present designs?

We don't have an end game, because we want the game to go on forever, to give our children a strategy of hope. This requires a strategy of change, which requires a great humility because we don't know what to do. It's

very unfortunate in my profession of architecture that the word humility and the word architect have not appeared in the same paragraph since *The Fountainhead*. This is a real problem. If anyone here has trouble with the concept of design humility, just reflect on the fact that it took five thousand years to put wheels on our luggage. We're really not that smart.

What can we do now so that the game goes on forever? Let me tell you where I come from, so you understand my view of this game. I was born in Tokyo, Japan, 1951 and I grew up in Hong Kong. As a child in Hong Kong I lived in a place with six million people on 40 square miles. During the dry season, we had four hours of water every fourth day. That's the world I grew up in. The relationship of the Chinese to the land is completely different than our relationship to it. This piece of dirt right here has been continuously farmed for five thousand years. How do you farm the same piece of earth for 50 centuries if you don't understand nutrient flow? In ancient China it was impolite to leave someone's house after a meal without leaving a deposit by the front door, because you were taking their nutrition. Why do people in China eat everything that is mobile, except maybe mosquitoes? Because you eat your protein before it flies or slithers away. It's a very, very tight equation. And they did it for five thousand years. It's only within the last three generations that they have adopted chemical agriculture.

If we look at my summers, they were spent on the Puget Sound of Washington state where my grandfather bought an old-growth forest, because he had won the Yukon lottery and he was a lumberjack. So he lived in a world of extreme abundance, and yet my grandparents were very careful to put fruit away for the winter and kept the spring clear and raised oysters and things like that. Then I went to high school in Connecticut and then college in New Hampshire and then to Yale. When I went to Yale, I went to a school of "the style". Look at Le Corbusier's *Unite d'Habitation*, in Marseille, a building in a Mediterranean climate designed with a *brise-soliel* to shield the sun, we'll talk about true south in a minute, cross ventilation and so on, and yet the style is affectionately known in our profession as brutalism.

If we look at Mies in 1928 with his astonishing skyscraper proposal for a six story Berlin, we realize it's all glass and it might have worked in Berlin but we built it in Houston and Miami. I would ask the question for the third time: where is true south? Perhaps the glass box is actually an oven, a gas chamber.

At what point would a young engineer, let's say a pyrotechnical engineer, studying something as important as internal combustion, be asked by an authority figure in the late 1930s to design Auschwitz? What would you say? What if your family's whole existence depended on your answer? What is your intention? How do you use your skills? What do you do? What do we do now? Negligence is knowing better and doing it anyway. Insanity is doing the same thing over and over again and expecting a different result. At what point do we find ourselves as a culture, negligently insane? It's perhaps time for a new design.

We saw the first fuel crisis in 1973, three dollar limit. If we look at the history of fuel in our generation, in 1973 OPEC was formed, the world's largest cartel. The price of oil went from \$15 a barrel to \$35 a barrel. At the time Sheik Yamani was asked, "What will you do when there are alternatives to oil being proposed?" He said, "Oh well that's very simple. We keep the price of oil very high and as soon as these alternatives come along, as soon as they start getting investments to actually get promulgated, we'll just drop the price of oil because its two dollars a barrel marginal crude in Saudi. So we'll just drop the price of oil and collapse all those investments. Then raise the price back up then keep going." He said this will probably happen every 10 years. So there we are. That was exactly what they did. It's what they said they would do. They told us the strategy.

The other question he was asked, which I found quite amusing, was, "When do you think we'll see the end of the age of oil?" His answer was, "I don't know if we will ever see the end of the age of oil, but I can tell you this: the Stone Age didn't end because we ran out of stones." The oil age won't end because we run out of oil. Today wind energy, for example, is cheaper than burning fossil fuels on the American plains. Why are Warren Buffet and his son investing in wind power in the Midwest?

What the Saudis can now do is let the price of oil float because China has come on board and they can make those investments in the alternatives. So we'll see the renewables brought into play. It's really critical that we get the renewables into play because if we look at the future we have about this much gas and about this much oil and about this much coal. There are only two forms of energy ubiquitous enough to provide for human need and they are coal and solar. Take your pick. It's critical that we get solar energy below 3-cents per kilowatt hour, below the price of coal as quickly as possible. It's about a 3 billion-dollar debt and that is why the Chinese have to make it. That's why we are working with China.

In 1984–85 we did the first so called green office for the Environmental Defense Fund. It took *Business Week* roughly 15 years to put it on the cover of their magazine. But look at the shrill message—Is your office killing you? It's pretty scary. We now look at indoor air quality and find indoor air worse than air above a superfund site. Can you imagine that?

We need new design. In 1969 we saw the earth from outer space and yet our designs haven't changed.

Remember how you throw things away? Anybody here want to point to "away"? Right, it's gone. Yet perhaps there is an away. Look at the Equator, the clockwise spirals of the southern hemisphere, the anticlockwise spirals of the northern hemisphere. This is known as the Pacific Gyre. It's a giant low-pressure area out over the Pacific, north of Hawaii. Two years ago they found six times as much plastic as plankton in the Pacific Gyre. Where did it come from? Off the west coast United States, six times as much plastic as plankton.

What is the other side of global warming? Well everyone hears about the climate and the CO₂ and the atmosphere. That's one thing. But guess what's going on in the oceans? The ocean pH has been 8.8 to 8.2 for 2 million



North Pacific Gyre
Illustration: Daniela Morell

years; we know this from the Ross Ice Shelf cores. It is now at 8.06. The expectation is, even with the Kyoto protocol, it will reach 7.9 pH acidity by the end of the century. At 7.9 pH, calcium carbonate goes into solution. This means we will dissolve the coral reefs at the end of this century. Today 48% of the anthropogenic carbon, not produced by humans since 1850, is in the oceans, not in the air. So we end up losing the crustaceans. We end up losing all the hard-shelled small animals, right up the food chain until we get to the highest predators which is us. This is not a pretty sight. We end up toast—species that are toast because of global warming and species that are jelly because of the ocean. At the end of the century it's toast and jelly. If that's our plan, we're doing great.

What other plan could we have? Let's start to focus on the new design. The new design is based on something quite ancient, the ancient forests with great biodiversity. As an architect I have to focus on things like gravity. It's just a good idea. It's the law, right. What other laws are here? Michael Braungart and I wrote *Cradle to Cradle*, to start to look at what our actions might mean for human artifice. If humans were still hunter gatherers, the earth could support about 4 million of us, that's it. We have a population of 6.4 billion. What are the other 6 billion meant to do? It's critical that we understand that we need human artifice, that's why the book is plastic. A lot of people say, what are you doing with a plastic book? It's ironic for people my generation because that means that Mr. Maguire in *The Graduate* was right; his key to success was plastics. But 90% of human artifice will have to be something in continuous closed cycles in the technical world. That's why we used plastic for our first book; plastic is a technical nutrient. *Cradle to Cradle 2*, which Michael and I are writing now, will come out as a biological nutrient and we'll surprise people. But the first one is a technical nutrient book. The fun thing is you can read it in the bathtub. Why would you use something as exquisite as a tree to do something as prosaic as writing on a flat white sheet?

We're here to talk about design today. It's a nice dark room; I'm going to give you a design assignment and I want you to really think hard about this. Close your eyes. I want you to design something that makes oxygen, sequesters carbon, fixes nitrogen, distills water, provides habitat for hundred of species, accrues solar energy as fuel, makes complex sugars and food, creates microclimates, changes colors with the seasons, and self replicates. How're we doing? We just put wheels on our luggage! How many things do you know that humans have made lately that made oxygen? Why would you use something as sophisticated as a tree and walk up to it and go, "Oh I could smash this thing and write on it?" Anyway, that's why the book is plastic.

Humans have evolved two fundamental syndromes of survival, as Jane Jacobs has pointed out. The first is the guardian, the state, and its job is to secure local society, create world peace and save the environment, at least that's how we see it. Commerce on the other hand, the other syndrome, is there to create prosperity. Now when you get these two syndromes, you have to understand that the guardian is the government. It's supposed to be slow. It's meant to be serious. It's meant to reserve the right to kill—states go to war, execute criminals and so on. It's meant to shun commerce

because if you get commerce into the guardian you corrupt it. Commerce on the other hand is meant to be quick. It's meant to be effective, efficient and highly honest because you can't do business with somebody very long unless you are honest. If you get the guardian and commerce together you get what Jane calls a "monstrous hybrid". If you get the guardian into commerce you slow it down. If you get commerce into the guardian you corrupt it. It would be like the mafia; it reserves the right to kill while it does business. That's a problem.

If we look at a regulation, it's a signal of design failure. A regulation is a signal of design failure because the state is stepping in, saying, "Wait a minute, we never gave you the right to kill. We'll tell you at what rate you can dispense death." What has been the typical green response? It's been efficiency. Let's be more efficient. Let's do more with less. The problem is that being less bad is not being good. It's being bad, just less so. That's why I don't think the green movement has had a lot of traction. Can you imagine I wake up in the morning, I go, "Oh I'm so bad. I have to be less bad. Mea culpa. My goal is zero." I mean, how much fun is that?

I won three presidential awards. One of them was the presidential award for sustainable development and since I'm the only individual who's won it, the press came running up afterwards at the White House and a reporter said, "Mr. Sustainable. What does it all mean?" I felt like Mr. Natural, and I said, "I'm not really that interested in sustainability." The reporter goes, "What?!" I said, "Yeah. What's your relationship to your wife? If you say sustainable, I'll say I'm sorry. It doesn't really sound that exciting. So what is this anyway, maintenance?" Efficiency is not really a quality. Efficiency is just a tactic. It is not a good in a philosophical sense. If you ask a philosopher, "Is efficiency good?" He would say, "Well what if you're a Nazi?" An efficient Nazi is worse than an inefficient Nazi. So efficiency is not a good. It has no value per se. The question is not "Am I doing something the right way?" That's a manager's question. Whatever it is you have to do as a manager, you want to do it efficiently.

The question becomes effectiveness and that's an executive's job. That's the designer's job. Am I doing the right thing? First we do the right thing; then we do it the right way. Then eco-efficiency would be the statistical quantification of lean production in nature, economy and society. So it's quantification. It's just numbers. It's just trying to be efficient and it's led us to degenerative technology. If we're making cars that pollute and they get more mileage and we make them more efficiently, we are still polluting.

We need a different kind of design. We need a new kind of eco-effectiveness, the statistical qualification of clean production in nature, economy and society. It's qualification. It's the quality of something that's clean and then we can do it in a lean way. This way we can get effective regenerative technology. I am designing a car just so I can address my critics who will say, "How could you possibly work with the Ford Motor Company?" Well who am I supposed to be working with?

Time magazine announced last week that I'm in charge of the sustainable design of a "top secret project" at Ford. Can you imagine that, having your top-secret project published in *Time* magazine? It's not top secret anymore.

What we're looking for is effectiveness and then efficiency. Do the right thing; then the right way. Clean, then lean. Because a tool has no value except for the purpose to which it is put. A hammer has no value per se. Is it a good? If I hit you in the face with it, it's not a good. If I build you a home with it, it might be a good. So how do we then put this into effect with the businesses we work with?

We work with over a trillion dollars worth of businesses now and governments. The way we work is quite simple. We put together an optimized sustainability goal of what a perfect world looks like. Then we chart out the flight path. Then we lay out our strategy on how to get there. Shareholder value is dollars. Stakeholder value is the public weal. Then we sit and say, "Ok, we can be more efficient but it can only take us a certain distance. How can we be more effective and get ourselves all the way there?" So we have projects that minimize which things are good because they can reduce your need and can bring to the goal much more quickly. But if you keep pushing for small statistical gains, you'll spend a lot of time and money to achieve very small results and you never get there. If you reduce your fossil fuel use to the minimum amount, you are still using fossil fuels. If you want to go solar you are going to have to make another transition. It still means you want to be as efficient as you can be because you can move that point much closer.

So we've moved from eco-efficiency to eco-effectiveness, from standard practice to cradle-to-cradle. That to us represents leadership. We can use the same criteria as everybody else. Can I afford it? Does it work? Do I like it? Obviously, at architecture school we reverse this where it's aesthetics, performance, and cost but, hey, the same three. To that we've added: Is it ecologically intelligent? Is it fair? And is it fun?

I've had the privilege of living in a house designed by Thomas Jefferson. Jefferson saw himself as a designer first. There is no question. Just look at his tombstone, his last design. On it he only recorded the things he designed. It says, "Thomas Jefferson, Author of the Declaration of American Independence, Statute of Virginia for Religious Freedom [which became the Bill of Rights], and Father of the University of Virginia." That's it. He's only recording his legacies, not his activities. There is no mention of him ever having been president of the United States, twice.

I work with the government of China. I'm working at creating solar energy at a scale that would bring it below the price of burning coal. When I told this to the White House they said, "How can you do this? The Chinese will get all the jobs again." I said, "Excuse me. If they send us collectors that make energy cheaper than coal we get four jobs for every job they get making collectors; installing them, cleaning them, hooking them up, deploying them over our highways, over parking lots."

Do you realize that if we had a solar collector that's a 109 miles on a site in Arizona, that's the amount of power the United States uses? That site in Arizona would power the entire United States, if we could transmit it around, which we could do by simply deploying them all over our highways, which are already zoned industrial. Think of how many jobs it

would create. And I promise the Chinese will never catch an American photon.

So what is competition? Competition comes from the Latin *competare*, which means “to strive together”. We strive together, that’s the point. It doesn’t mean destroy each other. It means compete like athletes, get fit together and then you can compete. Darwin has been misinterpreted by the business community as survival of the fittest meaning destroy the other. He really meant survival of the fittest. We’re meant to be an accruing species. We’re meant to be accruing species because in nature growth is good. When was the last time you heard an environmentalist say, “Growth is good”? The problem with the idea that growth is bad is that, for most of us, growth means the promulgation of asphalt. In our lexicon asphalt is two words: assigning blame.

When I went to college, I took a course called “Physics for Poets.” It was for those of us not going on into science. I remember that ‘c’ is a really big number, 186,000 miles/second and that if you squared it, that basically meant that it was infinitely large. If ‘m’ was therefore in any way positive, then ‘E’ was infinitely large. This is why Hiroshima disappeared and Einstein was afraid.

If we look at it from a designer’s perspective, from a poetic perspective, what we see is that energy is the sun. We have 5,000 times more energy from the sun than we’re going to need to power even 10 billion of us. So we will solve the energy problem. Because if you all went home and had 5,000 times more income than you needed to operate I bet you could figure out your home economics. We’re going to figure this out. The problem is we don’t have mass income. If we take all the chromium out of South Africa and put it into our products with bad design and distribute them in little holes around the earth, we’re going to poison the planet and future generations will wonder what we were thinking.

When you put energy and mass together and you end up with biology. If we look at Crick identifying DNA with Watson in 1953, he spent nine years looking for what he called the nature of vitalism, what it meant to be a living thing. He decided it had to have characteristics for growth: It had to have free energy from the sun. And it had to have an open system of chemicals benefiting the organism and its reproduction. So what if human artifice could be like a living thing and we could celebrate growth and celebrate free energy from sunlight and celebrate an open metabolism of chemicals? Then the question would not be growth or no growth but what do we want to grow? But this isn’t going to be easy.

If you recall, Charles DeGaulle was asked what it was like to be president of France and he said, “What do you think it was like trying to lead a country with four hundred kinds of cheese?” We want four hundred kinds of French cheeses; in biology we want full diversity; but in technology we don’t want four hundred kinds of French plastic. We want coherency in technology, diversity in biology.

We’ve basically characterized two metabolisms, one we call the biological metabolism, the other we call the technical. We design products as

biological nutrition, back to the soil safely or as technical nutrition, back to industry forever. Some can go both directions. We use criteria when we do this. We go down to the molecule. No more cancer, birth defects, mutagenic effects and disruption of endocrine systems, immune system disruptions, allergies, vertebrate toxicities, invertebrate toxicities, plant toxicities, heavy-metal content and so on. We look at where it is made. Where is it coming from? Where is it going? Does it affect the climate? Does it use genetic engineering? What are the social criteria that are involved?

The first products we looked at were textiles. In 1993 we analyzed 8,000 chemicals in the textile industry and had to eliminate 7,962. We were left with 38 chemicals and did the entire fabric line for Steelcase with those 38 chemicals. It's won three gold medals. It's been immensely successful in the market. It has now been selected for the interiors of the Airbus 380 because it's so clean. The fabric is clean enough to eat, which is good news for those frequent flyers. If you are at 40,000 feet with a fiber deficiency, you can eat your chair.

We now have databases with thousands of the chemicals used by humans in manufacturing down to the parts per million, parts per billion, so that we can assist manufacturers and designers all the way down to the molecular structure of their products based on biological and technical cycles. We have supply chain tools so that a company can put their name in and send out questions around a sustainable design protocol to all their upstream and downstream supply chain. We have biological nutrient fabrics. The water coming out of the textile mill that makes this fabric is as clean as the water going in, which is Swiss drinking water. It's an unregulated product. There's nothing to regulate.

With Shaw carpet, we've been able to celebrate their development of EcoWorx and a design collection in which the top fiber can go back to being fiber again forever. It's nylon. The backing is a thermal plastic polyolefin that is infinitely recyclable. Their sales approach is effectively called "the leasing concept" which has been taken up by the carpet industry with vigor, which is exciting for us. The problem is that people are still making PVC and claim they're green because they take their carpet back and you get recycled content and LEED points and all that kind of wonderful stuff, when all you're recycling are known problematic substances that create dioxins, one of the most carcinogenic things that humans have figured out how to make so far.

We have bio/technical nutrients. We did a car for Ford in 2003. We're doing the new car, according to *Time* magazine, which is true, for 2008. We've been working with Nike for six years on all their materials based on the cradle-to-cradle protocol. So a solar powered car, a bio/technical nutrient, can go back to soil or back to industry forever. We've created a cradle-to-cradle material and product certification procedure through MBDC. The protocol certifies against technical nutrition, biological nutrition, has award levels. Silver and platinum are toxic and Michael and I find that very funny. We use these criteria that we've developed around material health, around reverse logistics, stuff has to come back, design for environment, energy, water, and social responsibility. The criteria

are published and promulgated, and are quite simple. Some of the first products are really fun: surf board wax, skateboards, diapers. Ultron was the very first of the certified products, down to the molecule. We now have concrete additives, carpets, window shades, furniture. Herman Miller did the first one, Steelcase, Hayworth and so on.

Now I get to talk about architecture, since that's what I do for a living. This is what I do on my day job; our buildings signal our intention. A building that makes more energy than it needs to operate and purifies its own water. A building that generates more electricity in the course of a year than it needs to operate. With BP we worked on a building that purifies its own water. For Gap we built a building like a garden, their corporate campus, in 1994 in San Bruno, California. We had to negotiate with the federal government to collect native seeds because you can't go to a nursery and just ask for native seeds. You now can because this building is a nursery, there is a productive business on the roof of the building. A class-A office building in California was done with the same budget and schedule for Don Fisher, chairman of the Gap, the windows open. It's the first large-scale building to use raised floors. We had to write the codes for California to do this so that we could cool the buildings all night long and run them off of free cooling for the nighttime. We reduced the mechanical cooling by 70%. It won the Most Efficient Office Building in California Award; 70% less energy than an efficient office building—in California—and they have only 15 cubic feet per person and they have minimized daylight for energy consumption. Our office is full of daylight and full of fresh air, 100% in your breathing zone, under your own control. As we put it to the engineers: we would rather design a life support system for people who are working instead of a work support system for people who don't have a life.



The Gap corporate campus

Our project for Ford Motor's Rouge is a two billion dollar project that we're heading up the design part for maybe 20 years. The joke in Dearborn obviously is that this is a color photograph. Iron ore boats and lumber and coal came in here, coke ovens, blast furnaces, rolling mills, stamping mills, tool and die, rubber, wood, glass, metal and paint, finished car. So when we had to go present our scheme to the board for approval I had a minute and a half. As I walked in Bill Ford said, "I'm sure they didn't give you very much time. Take twice as long as they gave you." So we came in and said we've got three minutes to do this. We presented to the board a project that was for the birds. We had found with Price Waterhouse Coopers that the Clean Water Act liability on the site was 48 million dollars. They already had engineered the solution: three chemical treatment plants and a bunch of four foot concrete pipes. Our green roofs, porous paving and constructed wetlands were 13 million dollars. We saved them 35 million dollars on day one, which with the Ford Taurus at a 4% margin out of Chicago is equal to an order of 900 million dollars worth of cars. Approved, we built it, the world's largest green roof. It reduces the roof temperature to 75 degrees, during the whole year. They don't even need a chiller. We've invented a new kind of heating and cooling system for large buildings. There are only four rooftop units, everything else is day lighting. We treated the building as a duct. We got rid of all the ducting. We put louvers around the building that ventilate it. We move air through invisible ducts. We just let it move through the truck ducts when they're open and things like that.



Ford's River Rouge Plant

The parking lots are giant sponges. Water all comes in and gets purified before it gets to the river three days later, instead of ten minutes later. The roof changes colors through the season, creates oxygen, creates microclimates, self-replicates, creates habitat for hundreds of species. Killdeers were the first birds to arrive and nest. They were there within five days. We have 17 species of birds nesting on the Rouge now and 350-pound autoworkers listening to birdsongs on the Internet to try to identify the incoming species. This is what I was talking about before, engineers falling in love with birds. What kind of species would produce this kind of habitat for another species?

Our new museum for the first industrial revolution in England, for the National Museum of Science and Industry, is on an old airbase. They've been storing all the stuff from the first industrial revolution in these old airbases and they're bringing it all out and putting it in the new building. It's a sheep meadow, solar-powered. It's the least amount of carbon required to do a long span structure. That's six football fields. It is heated and cooled by the sun, so it produces more energy than it needs to operate. We won the competition by not competing with a building. We basically proposed that instead of just building a big coffin for old stuff for curators, that we have an elder hostel so that elders could come out of retirement to restore these old racecars and airplanes and typewriters and printing presses and things like that. So we're going to have a 600 bed elder hostel. The elders are going to get to live in the museum for two weeks while they restore things like old locomotives and while the kids come through and watch them do it. We'll be putting drill presses right out in the museum.

A reverse logistics distribution center is being developed for the distribution wing of Wal-Mart. Wal-Mart is taking up sustainability, as ironic as that sounds. The building is 10 million square feet, logistics and reverse logistics, taking stuff back. It sits in the landscape. It's invisible from the surrounding area by a berm. You can't see it. You can't hear it. It's all green roofs and solar collectors.

A new office complex and hotel that we're doing in Barcelona, with solar collectors on the office building going over to the hotel and the green roof winding underneath it like two snakes. We love Barcelona. Barcelona has taken up solar energy as part of its code for the city.

If a building can be like a tree, can a city be like a forest? We work with the city of Chicago on the Chicago Principles to make Chicago the greenest city in the nation, maybe the world. We are working with San Francisco to do the same thing. Why do I work in China? Well, I grew up there, for one thing. But the other thing is that China is now the lowest cost producer, most efficient economic-producer of just about everything. They are going to send us all their stuff and then we are going to put it through the most efficient distribution system, which is Wal-Mart; 80% of what goes through a Wal-Mart by volume ends up in a landfill in two months. Then we are going to send them back the worst of it, whatever we can't deal with like computer monitors from our hospitals and things like that. Then we are going to send them all our money.



The National Museum of Science and Industry

When I went to college, there was something called mutual shared destruction, MAD we called it. It was what caused *détente*. We always thought this was nuclear bombs, but now we are doing it with molecules. We didn't send the Chinese our money. We didn't send them a missile. So now we've got this incredibly difficult situation coming up where they won't be able to compete in a coherent way. The Chinese are not interested in destroying the American economy, I promise you, because they are very commercially minded. The first law of business is: do not kill your customer. So the Chinese have no vested interest in destroying the American economy whatsoever. The idea that they could make technical and biological nutrients and send them to the United States is actually fundamentally critical because we can then put these nutrients back, using reverse logistics into coherent industrial flows.

Those carpets that Shaw is selling, that we put our name on, they are going to customers who are going to call Shaw up when they are finished using the carpet because on the back of that carpet it says call Shaw and they will come to pick it up and bring you a new carpet and it's probably going to be made in Dalton, Georgia. It is not going to be made in Shanghai. This is a really critical issue for the rebuilding of American industry and the Chinese will be the key to it. There will be Chinese factories all over the US in 50 years. If you think I'm nutty then reflect on this: in 1947 if I said there would be a giant Japanese auto plant in Canton, Mississippi, you would have said I was nuts. We just beat them in a war. And they can't build cars. Now we give them tax breaks. We are going to be doing the same thing with the Chinese. Why? Because it's local employment and we're going to want jobs, and we're going to need these jobs. We have to rebuild American industry. ☺

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Resources:

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