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Cradle to Cradle

Michael Braungart and William McDonough

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CRADLE TO CRADLE

Michael Braungart was in the front rank of 1960s scientists who addressed environmental issues and while he was a chemistry student at Hannover University he founded the chemistry division of Greenpeace, and was one of the founders of Germany's Green Party. He has always worked 'for himself' and set up his Hamburg research company EPEA in 1988. It was when he established a New York office for EPEA that he met Bill McDonough, and together they created an American company, MBDC, in 1995. Michael has a lifelong professorship at the University of Luneburg in chemistry and process engineering, and in 2008 he took the joint chair created for him at Erasmus University in Rotterdam and in Delft, in both industrial ecology and Cradle to Cradle management for companies. He continues to publish as a chemist and to speak widely as Braungart Consulting.

William McDonough is an architect and founding partner of William McDonough + Partners which specialises in architecture and community design and has studios in Charlottesville, Virginia, and San Francisco. In 1996, he received the Presidential Award for Sustainable Development. In 1999 *Time* magazine recognised him as a 'Hero for the Planet', stating that 'his utopianism is grounded in a unified philosophy that . . . is changing the design of the world.' *Time* again recognised Bill McDonough and Michael Braungart as 'Heroes of the Environment' in October 2007. He was elected a 2008 International Fellow of the Royal Institute of British Architects. He is on the management committee of the University of Cambridge's 'Business and the Environment Programme', which is steered by the Prince

of Wales, and on the China-US Center for Sustainable
Development.

WILLIAM MCDONOUGH &
MICHAEL BRAUNGART

Cradle to Cradle

Remaking the Way We Make Things

VINTAGE BOOKS

London

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To our families,
and to all of the children of
all species for all time

*The world will not evolve past its current state of crisis
by using the same
thinking that created the situation.*

—ALBERT EINSTEIN

*Glance at the sun.
See the moon and the stars.
Gaze at the beauty of earth's greenings.
Now, think.*

—HILDEGARD VON BINGEN

*What you people call your natural resources our people
call our relatives.*

—OREN LYONS, *faith keeper of the Onondaga*

cradle
to
cradle

Introduction to the 2008 edition

In the twenty-some years since I came up with the phrase "cradle to cradle", it has become as complicated as a musical score. Now I can explain to the makers of photocopying machines what it means in their terms, and to new prawn farmers how to play it. But it is rather like the story I heard recently of a five-year-old child who knew only one Felix, and then was introduced to another Felix. He says to his father, "Did you know that Felix got a new face this week?"

This book still describes the underlying identity of Cradle to Cradle, but the concept has been rolled out much further than I foresaw when the book was first published in 2002.

In the nineteenth century various writers used the phrase "the hand that rocks the cradle is the hand that rules the world"—and to them this meant that the way we raise our children would do more to change the world than empire-builders and new industries. The hands that rock Cradle to Cradle today fit the phrase, I think, as our agenda is also about finding nurturing solutions very different to the often outrageous initiatives that harm the environment, sometimes by the same sort of institutions. Cradle to Cradle tries to put human beings in the same "species" picture as other living things—and

to us, a misuse of material resources is not just suicidal for future human generations but catastrophic for the future of life.

However, another guiding principle is that we can discuss Cradle to Cradle solutions in good humour—even with wit. The tone of the pages that follow is not generally that of most "environmental journalism" of the past six years. Early agriculturalists accepted "the law of return", which simply meant that the farmer should try to repay the earth for what he took from it. But he did not sit at his fireside and chew his nails, asking himself whether he got the best of the bargain. It was not a "law" which worried him—it was just clearly the right thing to do. Cradle to Cradle is a law of return but with materials rather than food-crops. Of course, materials science is harder than farming, but *we can do it*. There is no reason to adopt the stormy tones that other environmentalists often use.

This book describes how Cradle to Cradle got its foothold in the United States, but it doesn't describe how we watched while the greenhouse effect, the loss of species diversity, contamination of the biosphere, soil and ocean pollution, and other issues took the media's attention. We felt then, and still feel, that environmental protection is interpreted as the best solution to these problems, but doesn't this mean that our aim is simply to be "less bad". If the assumption is that human beings are bad for the planet, surely the best thing is for us not to be here at all. Zero emissions, zero footprint, reduction, avoidance, minimalization—the guilt language is very popular.

More control (being "less bad") is not the same as being good. It is not protecting your child if you beat him three times instead of five, and it is not protecting the

environment simply to use your car less often. When you do something wrong, don't try to improve upon it. It is not completely about frequency, as the next sentence illustrates: I was recently shown a new photocopying machine made with far better components, and which ran twice as fast on less energy consumption, but the paper still could not be composted. It could not go back into any biological cycle. Yes, it is "less bad" but the optimizations are in the wrong place.

Likewise, compared to tire components in the past, the particles of latex tires today have become much smaller. In some ways this change has been good, but latex is one of the key sensitizing ingredients provoking asthma. Now we can make "better" tires but as a result probably more people are unwell. Are we too quick to embrace some "solutions"? Britain has planned to build a hundred more waste incinerators—why? Through incineration you lose all the nutrients which should go back into technical or biological cycles. Copper in that waste, for instance, is worth about £80 million a year—and new copper is so much more rare than oil. Phosphate is also rare—it is incorporated in sludge—and then it too is lost when you put it into incinerators with municipal waste.

I think that using fire to fight "waste" is medieval behavior. It is a type of paranoia. When people feel insecure, they fall back on such behavior. The Cradle to Cradle approach is to see waste as food, as a nutrient for what's to come. It is about how to support the biosphere and how to support the technosphere. It is about being beneficial, about not panicking and destroying resources that we can pass onto our grandchildren and their grandchildren. If we are going to merely act out of guilt and live on tenterhooks, we are already too many people for this world. So I don't agree

with Al Gore who says in *Earth in the Balance* that we must heal the environment by stabilizing the population. It is like looking into the eyes of a child and saying, "It would be better if you were not here."

As you will read in the following pages, a remarkable variety of manufacturers initially responded to Cradle to Cradle— manufacturers of carpets, cosmetics, detergents, shoes, and many other things. It was also embraced by architects designing whole buildings. It is a process that not only involves chemically defining the ingredients to be employed, but also a social system of take-backs, far beyond various governments' recycling rules. When someone buys a floor covering from Shaw or Desso, it means that while he lives with that floor he imagines its afterlife. It means office furniture like that made by Steelcase and Orangebox is designed for disassembly time and time again, and the materials are chosen for their nearly infinite capacity to be reused. The long perspective is completely unlike the single reuse of popular "recycling", when your plastic bottle becomes your parka . . . and in five years the parka goes to exactly the same dead-end cradle- to-grave where a few years earlier your bottle would have gone.

As quickly as we can, we are learning that all materials have far longer use periods than people expect. Our materials systems are not yet proven to be infinite but I encourage Cradle to Cradle clients to picture themselves along an upward curve that shows them and their customers how far they have come. It is the old saying about how you first walk to the horizon, and then you can see where you should go.

Cradle to Cradle is a "support strategy". There is a competitive edge to Cradle to Cradle because any company that adopts the approach shows itself to be

research-minded and ambitious. But it is not about competition or controlling your neighbor. Cradle to Cradle is hugely successful in the Netherlands because the Dutch have, I think, a culture of support. If you don't support your neighbor in the Netherlands you will drown. One-third of the population lives below sea-level and you expect your neighbor to take care of the dyke as well.

In the Netherlands, the Ministry for the Environment is developing a procurement strategy for government organizations that uses Cradle to Cradle as the criteria for their purchases. Forty percent of the profits from natural gas have been allocated to Cradle to Cradle research and to financially fostering this innovation in those small Dutch companies which might struggle to realize it. This is different from the environmental approaches taken by governments which want to control and minimalize.

There are always small seeds to big stories, and this Dutch success came out of a television film *Waste Equals Food* made by Rob van Hattum in 2006. The response convinced me that it was partly the size of the Netherlands that made it ideal for Cradle to Cradle—a place small enough that academics and manufacturers can learn from each other, but also a place big enough that, if they don't want to, they don't have to work together either. I saw how Cradle to Cradle will look in the near-future with a variety of people accepting the message that we need to organize ourselves differently now, or we will be too late. In 2008 Cradle to Cradle opened a dedicated office in the Netherlands, in Venlo, which is working with consulting firms trained to give Cradle to Cradle advice to businesses, with people in the Dutch education systems, and with organizers like those

behind the nicely You-Tubed "Let's Cradle" conference in Maastricht.

In the autumn of 2008 I took a five-year chair at Erasmus University in Rotterdam. Erasmus is eminent in business studies, and the professorship there is in conjunction with Delft, one of Europe's key technical universities. In Germany, my professional work was as a chemical engineer, and you might think it unusual for a scientist to be taking a professorship in a business-studies department, but the level of flexible interaction I see at these universities is fantastic—professional management and those scientists searching for wide, behavioral solutions to environmental problems have never been closer. After five years we should have a Masters program for Cradle to Cradle in cooperation with the institute DRIFT, a world-centre for the kind of "transition management" on which we depend nowadays because of the startling rate of change and progress. The chair and my staff are partly funded by the Dutch government, and partly by the Royal Haskoning Foundation and by Dutch industry.

Originally, the biggest misconception was that Cradle to Cradle was *all* about redefining the "ingredients" of a product—and of course this is part of the approach. There are approximately fifty-five databases around the world that can give a company substitutions for the materials it is using: what are the alternatives to "x". My database also provides some good descriptions of what is lost with "y" and "z". I always emphasize that it is not strictly the substitutions themselves we are looking for, but how synergetic they are alongside the other components. Drink your glass of red wine with an aspirin—that can be the effect of combined chemicals. Organizations in California recently worried that a lack of

data was slowing down developments in this area, and speaking from the "yes we can" camp that always wants to develop more data, Bill and I agree that we need to know more—but it is not an excuse for stalling the implementation of Cradle to Cradle principles.

In the early years of Cradle to Cradle, the protocol was usually treated like a pilot project within a company—with one product created according to prescriptions about substitutions and disassembly, but only one. Now I see how Cradle to Cradle should be driven by the top management. It works best when the whole company wants to be different. The Dutch carpetmaker Desso, the waste-management and nutrient-providing company Van Gansewinkel, and the Welsh office-furniture company Orangebox are a few who are doing this.

Desso, for instance, has created a plan for the years ahead. It starts with the company finding alternatives for its bitumen and creating a different backing for its carpet tiles. They have decided to begin with those product lines which have the highest concentration of X-rated substances. Gradually, they will accept the challenge of finding a technology which enables them to take back their product and disassemble it. And going even further, they will start creating installation materials and cleaning products which work to Cradle to Cradle standards, so the whole life of a carpet tile is in the same frame. The manager of sustainability says that his job is to embed Cradle to Cradle in the very DNA of Desso.

If you are a company making an ultimately toxic product, it is rather like Tolstoy's line from *Anna Karenina*—that every unhappy family is unhappy in its own way: usually what you are doing in your company is creating a kind of environmental problem specific to your

business. But that famous Tolstoy line starts by saying that all happy families are alike, and as I watch companies work together on Cradle to Cradle ambitions I sense that they become more like-minded. Compared to 2002, when *Cradle to Cradle* was first published, it is now much easier to find suppliers who will cooperate with companies like Desso. Bill and I put Cradle to Cradle companies in touch if they want to share information about ingredients and supply chains.

Hundreds of research departments, both in small laboratories and giant corporate facilities, are getting a foothold in this approach. I want this book to encourage all of them, but I only have time to personally consult with a handful. Nowadays Cradle to Cradle is something many important manufacturers, from Hewlett-Packard to Philips, are pursuing under their own steam, and . . . well, there is no way of sounding modest about this, but I am pleased. However, while this book makes it appear as if originally we wanted only big-company relationships, and although their scientists were usually people from whom we learned a lot, Cradle to Cradle is also the right agenda for small, inspired companies. The Dutch company Happy Shrimp Farm and the Chinese company Earth Buddy are research partners, and we support the work of many small design businesses.

The Netherlands example is getting a toehold in other places. My co-author, Bill McDonough, has also worked in Europe recently—on Barcelona's Ecourban project and on Milan's Isola office with Hines Italia. Taiwan, Ireland, Israel and New Zealand have looked at ways of employing the Cradle to Cradle model. In 2007 Governor Schwarzenegger of California said he hoped that the state would one day use Cradle to Cradle as part of the California Green Chemistry Initiative. But the careers of